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This study covered the aircraft re	ework, overhaul	and remanufacture
processes at the six (6) Naval Air	r Rework Facili	ties (NAVAIREWORKFACs)
and identified those processes wh	ich were most c	ostly in the performance
of organic naval air denot level r	maintenance C	oncerned with the logistica

aspects of Naval Weapons Systems and the need to increase productivity within the Naval Air Industrial Community, the study focused on application opportunities related to manufacturing processes, methods, techniques and

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equipment associated with manufacturing technology functional categories. For the items being reworked, those elemental or sub-elemental operations which were most costly (viz, "cost drivers") were identified, ranked by aggregate cost for all NAVAIREWORKFACs, assembled within a data base, and presented in this Final Report.

Conclusions and recommendations resulting from the study are presented.

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MANUFACTURING TECHNOLOGY COST DRIVERS STUDY OF AIRCRAFT REWORK, OVERHAUL AND REMANUFACTURE PROCESSES

VOLUME I - FINAL REPORT



JANUARY 31, 1979



EXECUTIVE SUMMARY

The naval air rework facilities (NAVAIREWORKFACS) perform the highest (i.e. depot) and most inclusive level of maintenance on naval aircraft and aeronautical equipment. Inasmuch as the costs of performing this level of maintenance are substantial, the NAVAIREWORKFACS have continually sought ways of increasing cost effectiveness and industrial productivity. Toward this end, a requirement was established to study the aircraft rework, overhaul and remanufacture processes at the six (6) naval air rework facilities to identify those processes which represent the highest total cost of doing business in the organic depot naval air maintenance community. Any process, function or part which contributed significantly to the cost of an operation was defined as a cost driver. A study team, commissioned by the Chief of Naval Material, completed the cost drivers study on 31 January 1979. The results are summarized as follows:

Manufacturing technology (MT) functional categories were defined which were universal and applicable to all NAVAIREWORKFACS. The "top seven" most costly direct labor functional categories, which represent 72% of the total direct labor costs, were:

•	Electrical/Electronic	(20.9%)
•	Disassemble/Assemble	(16.7%)
•	Sheet Metal	(13.8%)
•	Testing	(6.9%)
•	Machining	(6.0%)
•	Hydraulic/Pneumatic	(4.7%)
	Strip/Finish/Paint	(4.0%)

The "top seven" most costly direct material functional categories, which represent 63% of the total direct material costs, were:

•	Electrical/Electronic	(16.2%)
•	Disassemble/Assemble	(13.3%)
•	Hydraulic/Pneumatic	(11.7%)
•	Machining	(6.7%)
•	Sheet Metal	(6.2%)
•	Helicopter Dynamic Components	(4.6%)
•	Compressor/Turbine/Engine Metal Repair	(3.9%)

The most costly direct labor rework programs were:

- Aircraft rework
- Component F/E material rework

The most costly direct material rework programs were:

- Component F/E material rework
- Engine rework

The most costly numerical control machine operations were:

- Machining center
- Lathe

The most costly conventional machine operations were:

- Grinder
- Lathe

A production shop survey, covering more than 7,500 direct labor people at the NAVAIREWORKFACs, was made to investigate the "top seven" functional categories in greater detail. Process elements were identified within each of the "top seven" functional categories. Those process elements which accounted for the highest costs within that functional category were referred to as "elemental cost drivers". By considering only the "top five" elemental cost drivers within each of the "top seven" functional categories (i.e., thirty-five total elemental cost drivers), 44.5% of the total direct labor costs were covered.

Direct labor costs are more susceptible to

NAVAIREWORKFAC management action than are direct material

costs. These latter costs are primarily affected by material

acquisition managers. Both direct labor and direct material

cost drivers should be reviewed to identify opportunities

for the application of manufacturing technology.

The results of this study can also be applied in other phases of NAVAIREWORKFAC operations, including:

- Staffing plans
- Training plans
- Equipment acquisition

- Facility construction
- Plant arrangement
- Handling and transportation
- Support functions

FOREWORD

In consideration of the recent DOD and Navy emphasis on manufacturing technology as an approach to improving industrial productivity, three study initiatives were sponsored by the Chief of Naval Material (MAT-08E4) covering the following areas:

- (New) Aircraft Manufacture
- Air-Launched and Sea-Launched Weapon Systems
- Aircraft Rework, Overhaul and Remanufacture
 Processes

Each study initiative was focused on identification of cost drivers involved in each program. Having identified the pertinent cost drivers, it would then be appropriate to apply manufacturing technology wherever possible to achieve improvements which would result in improved productivity. The intent of this approach was to concentrate on improving processes rather than make changes to products.

In implementing the NAVMAT initiative on aircraft rework, overhaul and remanufacture processes, a manufacturing technology (MT) study team was identified in Sept. 1977. It was composed of knowledgeable representatives from each of the six naval air rework facilities (NAVAIREWORKFACs) and an MT Study Director from NAVAIREWORKFAC North Island. As was true for each of the other initiatives noted above, it was decided to support this MT study team with a support

contractor. Following a competitive solicitation,

Systems Consultants, Incorporated was selected to be the MT study support contractor.

The planned approach to identifying cost drivers was to first stratify the overall NAVAIREWORKFAC effort into meaningful MT functional categories classified by both NAVAIREWORKFAC and by rework program. These data would then be analyzed in more detail to identify viable candidates for manufacturing technology applications. Wherever possible, existing reports were to be utilized. In exceptional circumstances, special reports could be made.

The MT study team and study contractor visited each of the naval air rework facilities located at:

- Alameda, CA
- Cherry Point, NC
- Jacksonville, FL
- Norfolk, VA
- North Island, CA
- Pensacola, FL

These visits assisted substantially in clarifying interpretations of data requirements and also in expanding the vistas of the participants. In fact, the team approach to the problem contributed to the synergistic outcome.

Cost drivers were identified from reports and data available at the various NAVAIREWORKFACs. Some types of reports were common and available at all NAVAIREWORKFACs and

some were unique and existed only at one or several of the NAVAIREWORKFACs. Both common and unique types of reports were used in the study. Data from these reports were analyzed, and cost drivers were identified.

The cost drivers are documented in two volumes.

Volume I, this volume, contains a complete discussion of the study methodology and the results of the data analyses. All results have been normalized and are presented as percentages in this volume. Volume II, separately bound, is an addendum which constitutes the data base for this study.

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SECTION I

INTRODUCTION

The United States has led the world in industrial productivity for many years. Furthermore, in terms of relative industrial productivity, the U.S. also led the world in growth for two decades after World War II. Since 1967, however, the rate of productivity increase within the U.S. has suffered in comparison with that of other industrial countries. Within this past decade, Japan's output per person-hour has grown 105%, West Germany's 62%, France's and Italy's 54%, and Canada's 39%. Even Great Britain's 25% increase has surpassed the 22% increase for the U.S. $\frac{1}{2}$ This lagging rate of increase has become a matter of national concern, and appropriate corrective action is both warranted and needed. In addressing this problem, it is desirable to identify appropriate and significant factors. According to Professor Edward Denison of the Brookings Institution, 2/ factors affecting productivity and their individual contribution to productivity growth are:

- Technology 38.1%
- Capital 25.4%
- Labor Quality 14.3%

Kimzey, Charles H. - "National Center for Productivity and Quality of Working Life" - Ninth Annual Tri-Service Manufacturing Technology Conference, Orlando, Florida, 3-7 October 1977.

^{2/} Harr, Karl G., Jr. - President, Aerospace Industries Assn. -Speech before American Astronautical Society, Houston, Texas, 1 November 1978

- Economies of Scale 12.7%
- Resource Allocation 9.5%

From this point of view, the greatest opportunity to improve productivity exists through considerations of technology. Technology is involved both in the design of an end-product and also in the means of producing that end-product. The field of manufacturing technology focuses on the means of producing end-products. The Naval Material Command has defined manufacturing technology (MT) as:

"effort directed toward the establishment of a new or the improvement of existing manufacturing processes, methods, techniques or equipment to reduce the costs of defense material and/or weapon systems by providing first-of-a-kind application to industrial scale operations. Remanufacturing operations are appropriate within the context of new technology application. This embodies the application of manufacturing know-how to the acquisition and life cycle of defense material. The techniques or process tooling employed are production oriented and are based on Research and Development demonstrated feasility or extrapolation of existing technology. Manufacturing technology is a process oriented function and is not directed at design changes in the weapon system hardware as in value engineering, but instead to the processes which result in the fabrication/ production of that hardware. It does include new methods of producing or processing basic materials required for fabrication of hardware."

Recognizing the importance of manufacturing technology, management of the Navy's MT program has been centralized in the Office of Director of Manufacturing Technology under the Chief of Naval Material. Within the past year, several manufacturing technology (MT) studies have been initiated. The intent of these studies is to identify high cost manufacturing areas affecting the Navy's community of interest and then to address

those areas wherein appropriate MT efforts appear to present investment opportunities. Three related cost driver studies, including this study, currently in process are:

- (New) Aircraft Manufacture
- Air-launched and Sea-launched Weapon Systems
- Aircraft Rework, Overhaul, and Remanufacture Processes

The Aircraft Rework, Overhaul and Remanufacture

Processes Study began in September 1977 with the appointment

of the Depot Overhaul MT Team Study Director and MT Team

members from each of the six naval air rework facilities

(NAVAIREWORKFACs). Following a competitive procurement

solicitation, an MT study support contractor was selected and

work commenced in May 1978. The results of this cost drivers

study are contained in this final report. The report consists

of Volume I - Final Report and Volume II - Addendum. All cost

driver data presented in Volume I are in percentages (i.e.,

normalized). Volume II constitutes the study data base.

The data base which was developed and used during this study was composed of actual cost or utilization figures. Furthermore, the period covered by the data base was longer than the in-process time for almost all of the items being reworked and thus was representative of completion cycle processes. For this reason, the six month period from July 1, 1977 to December 31, 1977 was selected as the base period. In general, data obtained from each NAVAIREWORKFAC

conformed to this desired time period. In those instances where this was not possible, the input data time period has been noted on the individual report figure.

To minimize disruption of NAVAIREWORKFAC operations, existing reports were used wherever possible as input sources to the data base. Thus, only in the final stage of the study was it necessary to obtain data through use of a special report. This involved the design and completion of a shop survey form. This will be discussed at greater length in Section VI.

SECTION II

DIRECT COSTS SYNTHESIS AND ANALYSIS

Cost data for this study were collected for each rework program at each of the six naval air rework facilities (NAVAIREWORKFACs). The facilities were located at:

- Alameda, CA.
- Cherry Point, N.C.
- Jacksonville, FL.
- Norfolk, VA.
- North Island, CA.
- Pensacola, FL.

The rework programs at these facilities cover the following:

- Aircraft rework
- Missile rework
- Engine rework
- Component F/E Material rework
- Other support
- Manufacturing

Within each of these program categories, voluminous cost data existed which related to completed products within that program. All planning, workloading, budgeting and controlling of work have been related to the completion of identifiable products within each program at each facility. However, data did not generally exist to identify the cost of the various processes which were involved in completing the

far-ranging spectrum of NAVAIREWORKFAC products. Thus the first task of this study was directed toward establishing MT functional categories which could provide a rational basis for the collection of process costs. After several iterations, these MT functional categories were established as shown on Figure 1. Although most of the functional categories are self-explanatory, certain amplifying remarks are in order, viz.:

- <u>Disassemble/Assemble</u> Refers primarily to aircraft and engine work performed on the 950/960 Division shop floor. Inasmuch as possible, electrical or sheet metal work done by the 950 Division is allocated separately to the appropriate MT functional category.
- Wire Cut/Manufacturing Refers to electrical cable manufacture.
- Testing Refers to aircraft line testing,
 engine test cell operations, or other operations being performed in the test of the product. Does not generally include in-process testing which is incidental to other significant
 MT functions.
- Miscellaneous Armament Includes Oxygen shop operations as well as other operations involving explosives inasmuch as the manufacturing operations and safety considerations are similar. Does not include ejection seat pyrotechnics.

FIGURE 1 DIRECT LABOR

1 JUL 77 - 31 DEC 77

		PERCENT BY PROGRAM								PERCENT BY NAVAIREWORKFAC						
MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY	COST DRIVER RANKING	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	ALAMEDA	CHERRY POINT	JACKSON VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	
EXAMINATION/EVALUATION	8	4.3	2.4	6.4	2.3	3.3	0.5	3.6	6.7	4,9	1.1	3.1	3.0	2.4	3.6	
DISASSEMBLE/ASSEMBLE	2	26.1	12.7	34.3	2.8	7.2	0.6	16.7	11.6	25.9	9.4	19.2	20.5	12.0	16.7	
ELECTRICAL/ELECTRONIC	1	15.6	7.5	4.9	36.4	14.4	3.5	20.0	18.2	16.8	23.0	19.0	18.4	25.8	20.0	
HYDRAULIC/PNEUMATIC	6	1.6	-	7.1	10.8	1,5	0.2	4.7	11.4	6.3	3.4	2.5	1.7	4.3	4.7	
BONDING	21	0.8	0.0	0.0	1.4	0.2	0.3	0.8	1.8	1.4		н.	0.7	1.0	0.8	
STRIP/FINISH/PAINT	7	6.3	1.8	1.6	2.1	2.6	3.4	4.0	3.9	4.2	7.1	2,4	4.0	4.3	4.0	
WELD	19	0.3	0.0	3.2	0.9	0.9	2.6	0.9	0.8	0.9	1.7	1,3	0.6	0,5	0.9	
MACHINING	5	2.4	0.1	14.9	6.1	5.0	29.8	6.0	5.8	5.3	6.3	5.9	6.4	6.3	6.0	
WIRE CUT/MANUFACTURING	15	0.4	0.7	0.1	0.7	0.7	17.9	1.3	0.0	0.7	0.5	1.7	3.2	129	1.3	
FORGE/FOUNDRY	30	0.0	C.0	0.1	0.1	0.4	3.0	0.2	0.4	0.4	0.1	=	0.1	0.3	0.2	
LAYOUT/PATTERN	27	0.1	0.0	0.0	0.0	1.3	6.5	0.5	0.4	0.2	-	0.8	0.3	0.9	0.5	
SHEET METAL	3	22.5	0.0	2.3	4,4	15.9	13.1	13.8	11.4	12.5	12.3	15.6	13.7	16.1	13.8	
CLEAN, ABRASIVE	17	0.6	0.4	2.7	1,7	0.5	0.4	1,1	0.9	1.4	2.2	1,6	0.4	0.9	1.1	
CLEAN, CHEMICAL	13	1.8	0.7	1.5	0.8	0.5	0.1	1.3	0.9	2.5	3-20	1:4	0.4	2.7	1.3	
HEAT TREAT	28	0.1	-	0.8	0.7	0.2	1.7	0.4	0.2	3	0.2	Ξ.	1.2	0.5	0.4	
PLATING	16	0.4	0.6	2.4	2.0	0.5	1.5	1.1	0.6	1.2	2.5	1.4	0.7	1.3	1.1	
PACKING/PRESERVATION	12	0.4	0.0	- 1,1	2.3	8.4	0.6	1.9	2.6	1,7	2.9	314	1.1	2.3	1.9	
CALIBRATION	9	0.2	0.0	0.0	4.2	16.6	0.0	3.1	4.3	1.5	4.1	1.9	4.5	1.8	3.1	
TESTING	(et a	9.6	44.0	6.8	2.3	5.8	0.6	6.9	9.2	3.3	4.0	6.0	10.1	4.9	6,9	
MISCELLANEOUS-		1.200	110000	414222	8.38				1		1					
ARMAMENT	11	1.5	28.9	0.4	2.7	1.7	0.2	2.1	2.6	1.0	2.7	4.2	0.6	1.5	2.1	
BEARINGS	22	0.1	-	0.8	1.3	0.4	4.9	0.7	1.3	0.6	0.5		0.9	1.1	0.7	
BLADES - PROP	26	0.0	0.0	2.1	0.7	0.4	-	0.5	-	3	0.4	2.0	1	72	0.5	
ROTOR	20	0.3	72	0.0	2.5	0.1	0.1	0.9	1 6	3.7	-	-	1.6	0.6	0.9	
CONTROL CABLES	36	0.1		(#)	0.1	0.1	0.3	0.1	-	-	0.0	-	-	0.3	0.1	
EJECTION SEAT	31	0.2	24	0.1	0.3	0.3	0.0	0.2	-		0.2	0.9	5	-	0.2	
FABRIC/RUBBER/PLASTICS	18	1.4	-	0.1	0.6	0.6	2.0	1,0	1.1	2.1	1.1	0.5	0.7	1.1	1.0	
FLIGHT CONTROLS & SUBASSM.	29	0.8	100	0.0	0.0	0.1	-	0.4	-	-	3.8	-	E 5	-	0.4	
FUEL CONTROLS & ACCESSORIES	14	0.8		4.1	1.4	0.9	0.1	1.3	-	F	3.5	4.0	0.4	1	1.3	
GROUND SUPPORT EQUIPMENT	10	0.7	100	0.0	4.5	4.6	4.3	2.3	3.2	0.6	2.8	1.2	4.6	0.3	2.3	
LANDING GEAR	25	0.6	E=:	0.0	0.9	0.2	0.1	0.6	0.8	0.9	0,5	0.4	-	1.2	0.6	
MECHANICAL MODS. & REPAIR	34	0.0			9	0.7	-	0.1	-	-	0.7		7.	15	0.1	
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	32	0.0	(381)	1.6	0.1	0.0	-	0.2	-	-	2.0	-	-	1 -	0.2	
CYLINDER & PISTON	33	-5	-	0.5	0.1	0.0	2	0.1	-	-	0.8	-		2.5	0.1	
PROTOTYPE	35	0.0	3.00	0.0	0.0	0.1	1.0	0.1	-	12	-	7425	0.2	in .	0.1	
FIELD SERVICE	24	0.0	122	0.0	0.5	3.8	0.7	0.6	-			1.6	7.	1,4	0.6	
HELO. DYNAMIC COMPONENTS	23	0.0	673	-	2.2	0.3	-	0.7	-	-	-	1-1	-	4.2	0.7	
TOTAL	22	100.0	100.0	100.0	100.0	100.0	100,0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

- <u>Miscellaneous</u> Data was provided under the following "miscellaneous" MT functional categories by some, but not by all NAVAIREWORKFACs, viz.:
 - Mechanical Modification and Repair
 - Compressor/Turbine/Engine Metal Repair
 - Cylinder and Piston
 - Prototype
 - Field Service
 - Helicopter Dynamic Components

These categories generally reflected a significant workload at the reporting NAVAIREWORKFAC(s) but perhaps not at the others. Inasmuch as the final review determined that the data for these items had a secondary impact on the study objectives, no further effort was made to insure consistency for these miscellaneous items themselves among the NAVAIREWORKFACs.

After identifying the MT functional categories, it was then necessary to relate production shops to an appropriate MT functional category. For those shops which performed multiple MT functions, it was necessary to estimate the proportion of effort between (or among) the categories and then apportion the costs accordingly. Also, in the data collection phase, it was necessary to identify and shift costs between categories as definition clarifications dictated. This apportionment was accomplished through use of "peacetime capacity" factors applicable specifically to that NAVAIREWORKFAC.

Direct labor costs did not include production expense, G&A expense or any other type of indirect or overhead expense. Costs of section, branch or division offices were not included, inasmuch as they were overhead expenses. Costs were accumulated by program for each facility. A six month test period (7/1/77 - 12/31/77) was selected and costs were collected accordingly. Since data were not available at each NAVAIREWORKFAC covering this test period, three facilities provided data covering the periods noted, viz.:

- Alameda 4/1/77 9/30/77
- North Island 7/1/77 7/1/78
- Pensacola 1/1/78 6/10/78

In the case of North Island and Pensacola, data were converted to a six month period through use of appropriate work-day ratios. Having apportioned the direct labor costs by MT functional category within both the rework programs and the naval air rework facilities, these costs were converted to percentages (i.e., normalized) and are given in Figure 1.

Direct material costs covered the same six month test period (i.e., 7/1/77 - 12/31/77) with the following exceptions:

- Alameda 4/1/77 9/30/77
- Norfolk 7/1/78 9/30/78
- North Island 7/1/77 7/1/78
- Pensacola 1/1/78 5/31/78

In the case of Norfolk, North Island and Pensacola, data were converted to a six month period through the use of appropriate work-day ratios.

After apportioning the direct material costs by MT functional category within both the rework programs and the naval air rework facilities, these costs were converted to percentages and are given in Figure 2.

Retaining the same stratification of data by

MT functional category, rework program and rework facility
as existed in Figures 1 and 2, the direct labor costs and
direct material costs were added together, the sums converted
to percentages, and the results given in Figure 3.

Inasmuch as the basic objective of this study was to determine cost drivers among the rework, overhaul and remanufacture processes, each MT functional category was ranked according to the total cost for all NAVAIREWORKFACs. The ranking is given on Figures 1, 2 and 3. For those MT functional categories which were apparently "tied", reference was made to the base data to provide the proper rank ordering.

Having determined the cost driver ranking among all of the MT functional categories, the "top seven" were selected for further analyses.

As given in Figure 1, the "top seven" direct labor cost drivers were:

- 1. Electrical/Electronic
- 2. Disassemble/Assemble

FIGURE 2

DIRECT MATERIAL 1 JUL 77 – 31 DEC 77

				PERCENT B	Y PROGRAM				PERCENT BY NAVAIREWORKFAC						
MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY	COST DRIVER RANKING	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	ALAMEDA	CHERRY POINT	JACKSON VILLE	NORFOLK	NORTH	PENSACOLA	TOTAL
EXAMINATION/EVALUATION	17	0.1		3,4	0.5	2.9	6.9	1.4	3.1	2.0	0.0	5.1	0.1	-	1.4
DISASSEMBLE/ASSEMBLE	2	16.7	1.6	36.3	4.7	4.7	1.3	13.3	11.8	25.2	10.1	26.7	6.8	6.6	13.3
ELECTRICAL/ELECTRONIC	1	14.6	11.5	1.3	24.4	16.3	2.8	16,2	15.5	14.0	20.0	14.9	16.8	15.6	16.2
HYDRAULIC/PNEUMATIC	3	7.9	2	7.4	17.2	2.4	0.2	11.7	32.7	9.6	5.8	7.2	8.5	13.3	11.7
BONDING	24	0.5	0.00	100	0.9	0.0	0.0	0.6	1.0	1.7	×	-	0.8	0.0	0.6
STRIP/FINISH/PAINT	22	2.0	0.40	0.6	0.5	0.3	3.9	0.9	0.1	3,4	0.1	1.2	0.0	1.2	0.9
WELD	23	1.3	-	0.9	0.4	0.7	1.7	0.7	1.4	1.5	0.5	0.8	0.4	0.3	0.7
MACHINING	4	2.8	-	5.6	8.9	3.0	9.4	6.7	0.8	6.9	0.9	2.0	10 4	12.8	6.7
WIRE CUT/MANUFACTURING	12	0.7	2.5	0.2	0.2	5.1	59.6	3.1	0.0	0.5	0.6	3.0	9.3	2	3.1
FORGE/FOUNDRY	33	0.0	-	0.0	0.0	0.0	0.4	0.0	0.0	0.2	0.0	146	0.0	0.0	0.0
LAYOUT/PATTERN	32	0.0		0.0	0.0	0.4	0.3	0.1	0.0	0.1	-	0.0	0.0	0.1	0.1
SHEET METAL	5	16.6	-	2.1	3,7	13.4	9.3	6.2	5.6	8.3	3,4	7.1	7.2	5.0	6,2
CLEAN, ABRASIVE	26	0.1	-	0.6	0.5	0.0	0.0	0.4	0.0	2.5	0.0	0.2	0.1	-	0.4
CLEAN, CHEMICAL	25	0.2	-	0.6	0.5	1.0	0.3	0.5	0.0	2.8	₹	0.5	0.0	-	0.5
HEAT TREAT	18	0.1	200	5.1	0.5	0.1	0.0	1,4	0.2	-	0.0	-	4.9	-	1.4
PLATING	27	0.1	0.1	0.4	0.3	0.1	0.1	0.3	0.0	1.6	0.0	0.5	0.0	-	0.3
PACKING/PRESERVATION	19	0.0		0.9	1.3	7.8	0.7	1,3	2.6	3,4	1,5	150	1.0	0.3	1.3
CALIBRATION	14	0.9	0.0	. 0.0	2.8	13.3	0.0	2.3	2.2	0.5	1,5	1.2	5.4	0.8	2.3
TESTING	10	6.1	3,3	5.5	1.4	7.1	0.7	3.4	3.2	6.9	3.0	1.4	4,1	1.6	3.4
MISCELLANEOUS-									11						100,000
ARMAMENT	8	4.3	81.1	0.2	2.9	5.7	0.3	3.8	5.5	0.7	3.8	10.0	2.2	2.6	3.8
BEARINGS	15	0.9	-	2.7	3,1	0.1	0.1	2.3	5.9	1.4	2.0	-	127	6.1	2.3
BLADES – PROP	28	0.1		0.1	0.5	-	-	0.3		-	0.3	1.5	-	-	0.3
ROTOR	9	2.7	-	0.1	6.3	0.1	0.0	3.7	-	4,5		-	9.9	1.7	3.7
CONTROL CABLES	31	0.2	1 72	72	0.0	0.1	0.3	0.1	-	=	0.0		-	0.4	0.1
EJECTION SEAT	29	0.4		-	0.1	0.8	0.6	0.2	-	~	0.1	1.2			0.2
FABRIC/RUBBER/PLASTICS	20	5.6	-	0.5	0.3	0.5	0.6	1.3	0.5	0.9	0.8	0.4	2.5	1.3	1.3
FLIGHT CONTROLS & SUBASSM.	30	0.7	2	-	0.0	0.0	-	0.1	-		1.0	177	-	1-	0.1
FUEL CONTROLS & ACCESSORIES	11	1.2	-	7.4	2.2	4.1	0.0	3,2	-	+	7.1	11.9	1.4	7.	3,2
GROUND SUPPORT EQUIPMENT	13	5.0	_	1.1	3,1	8.8	0.0	3.1	4.3	0.7	0.4	1.5	8,1	0.5	3.1
LANDING GEAR	16	5.9		- 100	2.0	0.3	0.0	2.0	3,4	0.9	2.2	1.5	100	5.2	2.0
MECHANICAL MODS. & REPAIR	24		-	-	(#)	-	-	-	-	2	143	-	14.5		**
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	7	= 1	-	13.8	1.6	0.7	-	3.9	-		27.9		-		3.9
CYLINDER & PISTON	21	2 1	-2	3.1	0.5	-	-	1.0	-	1777	6.9		-	-	1.0
PROTOTYPE	34	0.0	-	_ ^	0.0	0,0	0.3	0.0	-	-:		1.50	0.1	5	0.0
FIELD SERVICE	35	0.0	-	-	-	0.1	-	0.0	-	27	-	7.2	-	0.0	0.0
HELO, DYNAMIC COMPONENTS	6	2.1	-	_ **	8.4	0.1	-	4,6	-	1.00	3.5	-	-	24.5	4.6
TOTAL.	072	100.0	100.0	100.0	100.0	100.0	100.0	100,0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

L

FIGURE 3

DIRECT LABOR AND DIRECT MATERIAL

1 JUL 77 – 31 DEC 77

		PERCENT BY PROGRAM								PERCENT BY NAVAIREWORKFAC						
MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY	COST DRIVER RANKING	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	ALAMEDA	CHERRY	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	
EXAMINATION/EVALUATION	11	3.2	1.2	4.3	1.2	3.1	3,7	2.5	5.3	3.3	0.5	4.0	1.5	1.2	2.5	
DISASSEMBLE/ASSEMBLE	2	23.6	7.1	35.7	4.0	6.4	0.9	15.0	11.7	25.5	9.8	22.3	13,3	9.2	15.0	
ELECTRICAL/ELECTRONIC	1	15.3	9.5	2.4	28.9	15.0	3.2	18.1	17.2	15.2	21.2	17.3	17.5	20.5	18.1	
HYDRAULIC/PNEUMATIC	4	3.2	S=1	7.3	14.8	1.8	0.2	8.2	19.4	8.2	4.8	4,4	5.3	9.0	8.2	
BONDING	26	0.7	0.0	0.0	1.1	0.1	0.2	0.7	1.5	1.6	-		0,7	0.5	0.7	
STRIP/FINISH/PAINT	12	5.1	0.9	0.9	1,1	1.8	3,7	2.5	2.5	3.8	3.0	1.9	1.9	2.7	2.5	
WELD	23	0.6	0.0	1.6	0.5	0.8	2.2	0.8	1.0	1.2	1.0	1.1	0.5	0.4	0.8	
MACHINING	5	2.5	0.1	8.4	7.8	4.3	19.7	6.4	3.9	6.2	3.1	4.3	8.5	9.7	6.4	
WIRE CUT/MANUFACTURING	15	0.5	1.6	0.2	0.4	2.2	38.6	2.2	0.0	0,6	0.5	2.3	6.4	-	2.2	
FORGE/FOUNDRY	33	0.0	0.0	0.1	0,0	0.3	1.7	0.1	0.3	0.3	0.1		0.1	0.2	0.1	
LAYOUT/PATTERN	30	0.1	0.0	0.0	0.0	1.0	3.4	0.3	0.3	0.1	-	0.5	0.1	0.5	0.3	
SHEET METAL	3	21.0	0.0	2.2	4.0	15.1	11.2	10.1	9.2	10.1	7.0	12.2	10.3	10.3	10.1	
CLEAN, ABRASIVE	24	0.5	0.2	1,3	0.9	0.3	0.2	0.8	0.6	2.0	0.9	1.0	0.2	0.4	0.8	
CLEAN, CHEMICAL	22	1.4	0.4	0.9	0.6	0.7	0.2	0.9	0.6	2.7	-	1.0	0.2	1.3	0.9	
HEAT TREAT	21	0.1	-	3.8	0.6	0.1	0.9	0.9	0.2	-	0.1	1 H	3.1	0.2	0.9	
PLATING	25	0.3	0.3	1.0	1.0	0.4	0.8	0.7	0.4	1.4	1.0	1.0	0.3	0.6	0.7	
PACKING/PRESERVATION	17	0.3	0.0	1.0	1.7	8.2	0,6	1.6	2.6	2.6	2.1	0.8	1.1	1.3	1.6	
CALIBRATION	9	G.4	0.0	0.0	3.4	15.5	0.0	2.7	3.5	0.9	2.5	1.6	4,9	13	2.7	
TESTING	6	8.7	23.4	5.9	1.8	6.2	0.6	5.2	6.9	5.3	3.4	4.2	7.0	2.2	5.2	
MISCELLANEOUS-				1777	1											
ARMAMENT	7	2.3	55.2	0.3	2.9	3,0	0.3	3,0	3.7	0.8	3.3	6,5	1.4	2.1	3.0	
BEARINGS	18	0.3	-	2.1	2.4	0.3	2.5	1.5	3.0	1,1	1.4	12	0.4	3.7	1.5	
BLADES - PROP	28	0.1	0.0	0.7	0.6	0.3		0.4		-	0.4	1.8	-	-	0.4	
ROTOR	13	0.9	2	0.1	4,9	0.1	0.1	2.2	-	4.1	- 2	-	6,0	1.2	2.2	
CONTROL CABLES	34	0.1	-	-	0.0	0.1	0.3	0.1	-	-	0.0			0.4	0.1	
EJECTION SEAT	32	0.2		0.0	0.2	0.5	0.3	0.2		-	0.2	1.0		3. - 1	0.2	
FABRIC/RUBBER/PLASTICS	20	2.5	-	0.4	0.4	0.6	1.3	1.1	0.9	1.4	0.9	0.5	1.6	1.2	1.1	
FLIGHT CONTROLS & SUBASSM.	31	0.7	-	0.0	0.0	0.1	-	0.2	-		2.1		3=	-	0.2	
FUEL CONTROLS & ACCESSORIES	14	0.9	2	6.4	1.9	2.0	0.0	2.2	-	140	5.6	7,2	0.9	3 4 5	2.2	
GROUND SUPPORT EQUIPMENT	8	1,8	-	0.8	3.7	6.1	2.2	2.7	3.6	-	1.4	1.3	6.4	0.4	2.7	
LANDING GEAR	19	2.0	-	0.0	1.6	0.3	0.1	1.3	1.7		1.5	0.9	i e	3.3	1.3	
MECHANICAL MODS. & REPAIR	36	0.0	2	- 4	140	0.4		0.0	-		0.3	-	#3	(m)	0.0	
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	16	0.0	-	10.1	1,1	0.2	8 1	2.0	0,6	: 7 0	17.3	-	(5)	(2)	2.0	
CYLINDER & PISTON	27	-	=	2.3	0.4	0.0	8	0.5	0.9	-	4.4	-	- 1	-	0.5	
PROTOTYPE	35	0.0		0.0	0.0	0.1	0.6	0.0	173	1-0	(4.5	-	0,1	2	0.0	
FIELD SERVICE	29	0.0	=	- 0.0	0.2	2.5	0.4	0.3	186	:-:	-	0.9	122	0.7	0 3	
HELO, DYNAMIC COMPONENTS	10	0.6		-	6,1	0.2		2.6	-	175	:ec	12	70	14.7	2,6	
TOTAL	15023	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	

- 3. Sheet Metal
- 4. Testing
- 5. Machining
- 6. Hydraulic/Pneumatic
- 7. Strip/Finish/Paint

For each of the "top seven" direct labor cost drivers, the percentage of cost at each NAVAIREWORKFAC was identified as given in Figure 4. These "top seven" cost drivers aggregate 72% of the total direct labor costs for all facilities with a range of 65%-75% of the direct labor costs at any one facility.

As given in Figure 2, the "top seven" direct material cost drivers were:

- 1. Electrical/Electronic
- Disassemble/Assemble
- 3. Hydraulic/Pneumatic
- 4. Machining
- 5. Sheet Metal
- 6. Helicopter Dynamic Components
- 7. Compressor/Turbine/Engine Metal Repair

For each of the "top seven" direct material cost drivers, the percentage of cost at each NAVAIREWORKFAC was identified as given in Figure 5. These "top seven" cost drivers aggregate 63% of the total direct material costs for all facilities with a range of 50%-78% of the direct material costs at any one facility. The direct material costs are biased somewhat by extraordinarily expensive material demands

FIGURE 4
"TOP SEVEN" DIRECT LABOR COST DRIVERS
(PERCENT)

		NAVAIREWORKFAC									
MT FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	COST DRIVER RANKING			
ELECTRICAL/ELECTRONIC	18.2	16.8	23.0	19.0	18.4	25.8	20.0	1			
DISASSEMBLE/ASSEMBLE	11.6	25.9	9.4	19.2	20.5	12.0	16.7	2			
SHEET METAL	11.4	12.5	12.3	15.6	13.7	16.1	13.8	3			
TESTING	9.2	3.3	4.0	6.0	10.1	4.9	6.9	4			
MACHINING	5.8	5.3	6.3	5.9	6.4	6.3	6.0	5			
HYDRAULIC/PNEUMATIC	11.4	6.3	3.4	2.5	1.7	4.3	4.7	6			
STRIP/FINISH/PAINT	3.9	4.2	7.1	2.4	4.0	4.3	4.0	7			
SUB-TOTAL	71.5	74.3	65.5	70.6	74.8	73.7	72.1				
ALL OTHERS	28.5	25.7	34.5	29.4	25.2	26.3	27.9				
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0				

FIGURE 5
"TOP SEVEN" DIRECT MATERIAL COST DRIVERS (PERCENT)

		NAVAIREWORKFAC										
MT FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	COST DRIVER RANKING				
ELECTRICAL/ELECTRONIC	15.5	14.0	20.0	14.9	16.8	15.6	16.2	1				
DISASSEMBLE/ASSEMBLE	11.8	25.2	10.1	26.7	6.8	6.6	13.3	2				
HYDRAULIC/PNEUMATIC	32.7	9.6	5.8	7.2	8.5	13.3	11.7	3				
MACHINING	0.8	6.9	0.9	2.0	10.4	12.8	6.7	4				
SHEET METAL	5.6	8.3	3.4	7.1	7.2	5.0	6.2	5				
HELICOPTER DYNAMIC COMPONENTS	-	=	_	_	<u></u>	24.5	4.6	6				
COMPRESSOR/TURBINE/ ENGINE METAL REPAIR	-		27.9	<u> </u>	-	_	3.9	7				
SUB-TOTAL	66.4	64.0	68.1	57.9	49.7	77.8	62.6					
ALL OTHERS	33.6	36.0	31.9	42.1	50.3	22.2	37.4					
TOTAL	100.0	100.0	100,0	100.0	100.0	100.0	100.0					

at two of the facilities. NAVAIREWORKFAC Pensacola, the primary helicopter rework facility, realizes large material costs for helicopter dynamic components. It should be noted that NAVAIREWORKFAC Pensacola does not have an engine rework program. NAVAIREWORKFAC Jacksonville has a very substantial engine rework program, which accounts for the large material costs associated with compressor, turbine and engine metal repair.

and direct material cost drivers, the percentage of cost at each NAVAIREWORKFAC was identified as given in Figure 6.

These "top seven" cost drivers aggregate 66% of the total direct labor and direct material costs for all facilities with a range of 53%-72% of the combined costs at any one facility. It should be noted that the first six of the cost drivers are the same as was the case for the direct labor cost drivers, although the order has been slightly rearranged. The seventh cost driver is different, however. The appearance of "Misc. - Armament" as the #7 cost driver is due primarily to the high material costs at NAVAIREWORKFAC Norfolk for the missile rework program.

The percentage of cost at each NAVAIREWORKFAC contributed to the total cost as given in Figure 7. Likewise, the percentage of cost for each rework program to the total cost is given in Figure 8.

FIGURE 6
"TOP SEVEN" DIRECT LABOR & DIRECT MATERIAL COST DRIVERS (PERCENT)

		NAVAIREWORKFAC									
MT FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	COST DRIVER RANKING			
ELECTRICAL/ELECTRONIC	· 17.2	15.2	21.2	17.3	17.5	20.5	18.1	1			
DISASSEMBLE/ASSEMBLE	11.7	25.5	9.8	22.3	13,3	9.2	15.0	2			
SHEET METAL	9.2	10.1	7.0	12.2	10.3	10.3	10.1	3			
HYDRAULIC/PNEUMATIC	19.4	8.2	4.8	4.4	5.3	9.0	8.2	4			
MACHINING	3.9	6.2	3,1	4.3	8.5	9.7	6.4	5			
TESTING	6.9	5.3	3.4	4.2	7.0	3.2	5.2	6			
MISC-ARMAMENT	3.7	0.8	3.3	6.5	1.4	2 _: 1	3.0	7			
SUB-TOTAL	72.0	71.3	52.6	71.2	63.3	64.0	66.0				
ALL OTHERS	28.0	28.7	47.4	28.8	36.7	36.0	34.0				
TOTAL	100.0	100.0 [°]	100.0	100.0	100.0	100.0	100.0				

FIGURE 7

DIRECT COSTS BY NAVAIREWORKFAC (PERCENT)

(7/1/77 - 12/31/77)

	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
DIRECT LABOR	18.0	10.4	9.4	21.4	23.9	16.9	100.0
DIRECT MATERIAL	11.2	14.0	13.9	14.9	27.2	18.7	100.0
DIRECT LABOR AND DIRECT MATERIAL	14.7	12.2	11.6	18.2	25.6	17.8	100.0

FIG. 8

DIRECT COSTS BY PROGRAM (PERCENT)

(7/1/77 - 12/31/77)

	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL
DIRECT LABOR	44.9	1.5	9.4	29.6	10.5	4.2	100.0
DIRECT MATERIAL	16.5	1.5	21.8	50.3	5.6	4.2	100.0
DIRECT LABOR AND DIRECT MATERIAL	30.9	1.5	15.5	39.8	8.1	4.2	100.0

Of the two types of costs, labor and material, the management of the NAVAIREWORKFACs usually has a greater opportunity to control labor costs than to control material The material requirements for each rework program are normally dictated by the amount of rework required as determined by technical considerations, material conditions or elapsed time since manufacture or rework of the item. acknowledged that the high material cost drivers should be analyzed with the objective of reducing costs through the application of manufacturing technology to their production. However, this phase of acquisition is normally the responsibility of an acquisition manager. It is considered that, in the case of material costs, the acquisition manager should be the primary agent concerned with the application of manufacturing technology by the vendor to reduce material costs and thus increase productivity. NAVAIREWORKFAC management, however, should know which are the direct material high cost drivers and take action regularly to reduce the use of all materials to the lowest level possible while still meeting all product quality requirements. It would be helpful for NAVAIREWORKFAC management to identify high material cost drivers to the acquisition manager so that proper acquisition management action could be taken.

Among the costs incurred in the operation of the naval air rework facilities, direct labor costs apparently are most susceptible to control by NAVAIREWORKFAC management. Through identification of those high cost driver

processes being accomplished within direct labor cost

MT functional categories, likely candidates for the application of manufacturing technology by the NAVAIREWORKFACs can be determined. For this reason, further cost driver process definition in this study was focused on direct labor cost

MT functional categories. This further identification of high cost driver direct labor processes is reported in Section VI of this volume.

SECTION III

MASTER DATA RECORD (MDR) ANALYSIS

General

The master data record (MDR) is the primary working document, other than specific technical directives, which specifies what rework is required and the order in which it must be performed. This document is originated and maintained by the Operations Analysis Division of the Production Engineering Department within each NAVAIREWORKFAC. In recent years, under the aegis of the analytical maintenance program (AMP), the MDRs have been expanded in detail to furnish substantially all of the information to the mechanic and the production support organization which is necessary for the rework of that product. For each operation described, a standard time is cited by the Methods and Standards Division of the Production Engineering Department. MDRs describe both operations which must always be performed (i.e. mandatory) and those which are only performed when circumstances dictate (i.e. optional). They also describe work content for overhaul operations and repair operations. This distinction applies generally within the engine rework program. For this study, selected MDRs produced under the analytical maintenance program were analyzed for the purpose of identifying rework processes in detail for both the aircraft and the engine rework programs.

Aircraft Rework

The type-model-series (TMS) aircraft chosen for analysis in this study covered a broad spectrum of fleet aircraft and depot level maintenance requirements. The A-4M was an example of a very mature type/model aircraft with a well established basic design which has been in the fleet for many years. The F-14A was representative of a very recent addition to the fleet inventory with a somewhat nascent design. The F-4J was representative of a major conversion operation, from F-4J to F-4S, which was sponsored within the service life extension program (SLEP). For each of these aircraft, their respective MDRs covered Standard Depot Level Maintenance (SDLM).

In reviewing the aircraft MDRs, it was necessary to classify the data to facilitate further analysis. One classification was with respect to manufacturing technology sub-functions as listed below:

- Examination; evaluation
- Remove; disassemble; disconnect; scrap
- Install; attach; rework
- Adjust; rig
- Lubricate; service; seal
- Operate; check; test
- Clean; strip; paint
- Correct E&E discrepancies
- Other

The other aircraft MDR classification was with respect to aircraft system. This generally reflected the trades of the artisans performing the rework. The systems chosen, with a brief description of each, were as follows:

- Structures Refers to wings, fuselage, tail section, control surfaces, canopy.
- Electrical/Electronic Refers to wiring systems, antennae, aircraft lighting.
- Mechanical Refers to aircraft control systems,
 landing gear, arresting gear.
- Hydraulic/Pneumatic Refers to hydraulic/ pneumatic systems.
- Ordnance Refers to armament, ejection seat
 pyrotechnics, explosive cord devices.
- Equipment Refers primarily to "black boxes"
 installed in aircraft.
- Power plant Refers to engines, fuel cells,
 fuel lines.
- Other Move, tow, clean-up aircraft, log sell operations.

Of the total standard hour effort defined by the A-4M MDR, 58% covered selective disassembly and rework. This was the optional portion of the MDR which was performed when necessary as dictated by the condition of a particular A-4M in standard depot level maintenance rework. It was necessary to determine how much of this optional rework was being

performed normally at NAVAIREWORKFAC Pensacola on A-4M aircraft currently in rework. The current A-4M SDLM norm and the allowance for technical directives were identified. After subtracting the standard hours for the 100% accomplishment tasks (i.e. mandatory rework) as defined in the MDR from the total hours in the norm plus technical directives, the average number of hours allowed for selective disassembly and rework was determined. This optional rework allowance was 40% of the total MDR standard hours identified for selective disassembly and rework. This factor was then applied to each of the selective disassembly and rework sub-function and system totals to obtain an increment which was then added to the appropriate mandatory sub-function and system elements of the total MDR. These numbers were the basis for the division of effort among both the MT sub-functions and the aircraft systems as they are defined above.

A review of the F-14A norm hour breakdown for a recent quarter verified that 33% of the total rework effort was performed by process shops and the time for that (concurrent) rework was not included in the MDR standard time. Thus, the analysis of MT sub-functions and systems for the F-14A was made on that basis. All work specified in the MDR was considered to be mandatory.

Likewise, all work specified in the F-4J MDR was considered to be mandatory. The MDR covered that work which comprised the basic SDLM plus the identification of some conversion work applicable to the F-4J as part of the service

life extension program (SLEP).

The standard hours required to perform the rework involved in both the manufacturing technology sub-functions and also the aircraft systems were converted to percentages of total effort for that TMS aircraft and are given in Figures 9 and 10.

The cost drivers identified by the aircraft MDR analysis were:

• MT Sub-function

F-14A A-4MInstall; attach; rework Install; attach; rework 1. 1. 2. Operate; check; test Operate; check; test 2. Clean; strip; paint 3. Clean; strip; paint 3. Remove; disassemble; 4. Remove; disassemble; 4. disconnect; scrap disconnect; scrap

F-4J

- 1. Install; attach; rework
- Remove; disassemble; disconnect; scrap
- 3. Operate; check; test
- 4. Clean; strip; paint

System

	A-4M		F-14A		F-4J
1.	Electrical/Electronic	1.	Structures	1.	Structures
2.	Structures	2.	Mechanical	2.	Electrical/ Electronic
3.	Equipment	3.	Power plant	3.	Mechanical
4.	Power plant	4.	Equipment	4.	Power plant
5.	Mechanical	5.	Electrical/ Electronic	5.	Hydraulic/ Pneumatic

FIGURE 9

AIRCRAFT REWORK DIRECT LABOR BY MANUFACTURING TECHNOLOGY SUB-FUNCTION (PERCENT OF TOTAL STANDARD HOURS)

1				MANUFACTURING TECHNOLOGY SUB-FUNCTION								
AIR- CRAFT	SUB-PROGRAM	EXAM./ EVAL.	REMOVE/ DISASSEM/ DISCONN/ SCRAP	INSTALL/ ATTACH/ REWORK	ADJUST/ RIG	LUB./ SERVICE/ SEAL	OPERATE/ CHECK/ TEST	CLEAN/ STRIP/ PAINT	CORRECT E&E DISCREPS.	OTHER		
A	∆-4M	STANDARD DEPOT LEVEL MAINTENANCE (SDLM)	0.4	8.5	42.0	1.6	2.8	34.1	10.4	-	0.2	
F	-14A	STANDARD DEPOT LEVEL MAINTENANCE (SDLM)	1.9	8.7	48.3	7.2	2.0	12.7	15.9	3.2	0.2	
F	F-4J	SERVICE LIFE EXTENSION PROGRAM (SLEP)	1.8	10.0	69.6	1.9	0.5	6.9	5.0	3.9	0.2	

FIGURE 10

AIRCRAFT REWORK DIRECT LABOR BY SYSTEM (PERCENT OF TOTAL STANDARD HOURS)

AIRCRAFT	SUB-PROGRAM	SYSTEM							
		STRU.	ELEC.	МЕСН.	HYDR/ PNEU.	ORDN.	EQUIP.	POWER PLANT	OTHER
A-4M	STANDARD DEPOT LEVEL MAINTENANCE (SDLM)	21.3	43.5	6.6	0.5	0.8	15.7	11.2	0.4
F-14A	STANDARD DEPOT LEVEL MAINTENANCE (SDLM)	61.5	6.9	10.8	1.4	2.4	7.0	9.2	0.9
F-4J .	SERVICE LIFE EXTENSION PROGRAM (SLEP)	54.2	11.8	9.2	6.9	1.1	5.8	8.3	2.6

NOTES:

STRU. = STRUCTURES

ELEC. ' = ELECTRICAL/ELECTRONIC

MECH. = MECHANICAL

HYDR/PNEU. = HYDRAULIC/PNEUMATIC

ORDN. = ORDNANCE EQUIP = EQUIPMENT

Engine rework

The largest proportion of the U.S. Navy's engine rework program deals with gas turbine engines. For this study, it was decided to review and analyze the master data records for a turbo-prop engine and a turbo-jet engine.

The T56 was chosen as representative of a turbo-prop engine.

The J79 and LM1500 represented the turbo-jet engines. In each case, the rework processes were classified by LAGTAB element. LAGTAB is explained in greater detail in Section IV of this volume. The standard hours to perform each operation were identified and normalized to the percentages reported in this volume. The T56 MDR analysis is given in Table 1, and the J79 and LM1500 MDR analysis is given in Table 2.

The cost drivers identified by the engine MDR analysis were:

T56

- 1. CER and Minor Repair
- 2. Machines
- 3. Parts Processing
- 4. Induction/Disassembly
- 5. Test

J79-10A/B

- 1. Parts Processing
- 2. CER and Minor Repair
- 3. Cleaning
- 4. Machines
- 5. Accessories Processing/ Induction/Disassembly

J79-8B/C/D, J79-10

- 1. CER and Minor Repair
- 2. Parts Processing
- Machines
- 4. Induction/Disassembly
- 5. Cleaning

LM1500

- 1. CER and Minor Repair
- 2. Parts Processing
- Cleaning
- 4. Machines
- 5. Accessories Processing

TABLE 1

T56 ENGINE MDR ANALYSIS

(PERCENT OF ENGINE STANDARD HOURS TOTAL)

CLASSIFIED BY LAGTAB SEGMENTS

LAGTAB Segment	Description		Percent
01	Examination and Evaluation Examine Evaluate Screen Sub-Total	$ \begin{array}{c} 3.1 \\ 0.0 \\ 0.1 \\ 3.2 \end{array} $	3.2
02	Induct/Disassemble Disassemble Remove Sub-Total	$ \begin{array}{r} 8.4 \\ 2.4 \\ 10.8 \end{array} $	10.8
03	Cleaning Clean/Strip/Abrasive Surface Preparation Blast Bead Glass Bead Grit Seed Rice Hulls Sub-Total	1.0 0.2 0.8 0.0 0.1 0.1 0.0 0.0 2.2	2.2
04	Non-Destructive Testing X-Ray/NDT Electric Read-Out Machine (EROM) Sub-Total	2.7 0.1 2.8	2.8
06	Parts Processing Paint/Bake/Epoxy Resin Weld Spray Metal Spray Plasma Plate Nickel-Cadmium Plate Copper Plate Silver Plate Nickel-Copper-Silver Plate Chrome Aluminum Oxide/Black Oxide	0.7	

	Heat Treat Mask Shot Peen Stress Relieve	0.1 0.2 0.2 0.3	
	Diffuse	0.1	
	Sub-Total	10.9	10.9
07	Machines Braze/Grind/Buff/Mill/Face Drill and Bore Ream and Countersink Machining Tap Holes Repair Threads Chamfer Manufacture Hone Bushing Electrode Oxidation/Elect-	3.2 0.5 9.2 0.1 0.3 0.0 0.3	
	ric Discharge Machining (ELOX/EDM) Sub-Total	$2\frac{0.5}{2.4}$	22.4
08	Accessories Processing Recondition Sub-Total	$\frac{2.1}{2.1}$	2.1
10	Compressor and Turbine Balance Sub-Total	1.5 1.5	1.5
13	CER and Minor Repair Assemble Check Inspect Technical Directives Overhaul Service/Flush Repair Remove Studs Remove Threads Remove Plugs Remove Bushing Remove Solder Install Install Studs Install Plugs Replace Replace Studs	15.8 3.0 0.5 4.3 0.5 0.4 0.1 0.1 0.0 0.1 0.0 2.5 0.2 0.1 1.3	

	Replace Thre	eads	0.1	
	Replace Shi		0.1	
	Replace Bus		0.2	
	Ream	3 /.	0.0	
	Safety Wire		0.5	
	Dress Threa		0.2	
	Degrease		0.1	
	Press/Strai	ghten	0.2	
	Route out C		0.0	
	Rework		5.6	
	Resize		0.1	
		Sub-Total	36.8	36.8
14	Test			
7.7	Test		$\frac{7.2}{7.2}$	
		Sub-Total	7.2	7.2
15	Preservation			
	Package		$\frac{0.1}{0.1}$	
		Sub-Total	0.1	0.1
		Grand-Total		100.0

TABLE 2 J79/LM1500 ENGINE MDR ANALYSIS (PERCENT OF ENGINE STANDARD HOURS TOTAL) CLASSIFIED BY LAGTAB SEGMENTS

Page 1 of 6

LAC	GTAB SEGMENT DESCRIPTION	ı	J79-8B/C/	D	J79-10	J79-10A	J79-10B	LM1500
01	Examination & Evaluati	.on				1.0	2 2	1 2
	Examine	Sub-Total	$\frac{2.5}{2.5}$ 2.	5	$\frac{2.1}{2.1}$ 2.1	$\frac{1.8}{1.8}$ 1.8	$\frac{2.3}{2.3}$ 2.3	$\frac{1.2}{1.2}$ 1.2
02	Induct/Disassemble							2 2 3
	Deblade		0.2		0.2			0.2
	Disassembly		5.3		6.0	3.3	2.6	1.5
	Identify		0.3		0.4	0.6	0.4	0.4
	Remove		1.6		1.7	1.9	2.3	2.0
	Separate		0.0		0.0	0.0	0.0	0.0
	Sort	8	0.4		0.5			0.5
	Un-can		0.1		$\frac{0.1}{9.0}$ 9.0			$\frac{0.1}{4.9}$ 4.9
	van har standstad	Sub-Total	7.9 7.	9	9.0 9.0	5.8 5.8	5.3 5.3	4.9 4.9
03	Cleaning							
	Abrasive Blast		0.1			0.1		0.1
	Aluminum Oxide Blast		0.4		0.4	0.8	0.7	0.5
	Garnet Blast		1.8		1.9	2.7	2.6	2.5
	Glass Bead Blast		0.1		0.1	0.1	0.1	0.1
	Sand Blast		0.3		0.3	0.4	0.4	0.2
	Soft Grit Blast		0.8		0.8	1.4	1.1	0.9
	Clean		2.5		1.3	2.6	1.2	1.0
	Steam Clean		0.0		0.0	0.0	0.0	0.0
	Ultrasonic Clean		0.1		0.1	0.1	0.1	0.1
	Acid Passivate		0.0			0.0	:	
	Buff	3.	0.0		0.0	0.0	0.0	0.0
	Rust Remover	2.5	0.1		0.1	0.1	0.1	0.1
	Scale Conditioner		0.0		0.0	0.1	0.0	0.0
	Vapor Degrease		0.0		2.1	3.2	2.2	2.1
	Wash		0.1		0.1	2.3	4.7	4.3
	114644	Sub-Total	6.2 6.	2	7.2 7.2	14.0 14.0	13.4 13.4	11.9 11.9

TABLE 2

J79/LM1500 ENGINE MDR ANALYSIS

(PERCENT OF ENGINE STANDARD HOURS TOTAL)

CLASSIFIED BY LAGTAB SEGMENTS

Page 2 of 6 LAGTAB SEGMENT J79-8B/C/D J79-10 /DESCRIPTION J79-10A J79-10B LM1500' Non-Destructive Testing Magnetic Particle 0.4 0.4 0.5 0.4 0.4 Zyglo/Fluorescent Penetrant 1.5 1.6 1.7 1.5 1.6 Sub-Total 1.6 1.9 2.1 2.1 2.1 2.1 1.9 Examine & Route Examine & Route 1.2 1.3 2.0 1.5 1.3 Route 0.0 0.1 0.1 Sub-Total 1.3 1.3 1.3 2.0 1.5 1.4 1.4 1.3 2.0 06 Parts Processing Bake/Bake to Dry 0.2 0.0 0.0 0.3 Cold Work ___ 0.0 ------Cure 0.1 0.1 0.1 0.1 0.1 Form 0.1 ------___ ---Heat/Bend/Repair 7.7 8.1 8.6 7.3 6.6 Heat Treat/Temper 0.2 0.2 0.2 0.2 0.2 Shot Peen 1.0 1.2 1.7 1.6 1.2 Stress Relieve/Strain Relieve 0.2 0.2 0.3 0.2 0.2 Braze 0.1 0.2 0.0 ---0.0 Solder 0.2 0.1 0.3 0.2 0.2 Weld 4.1 4.4 2.3 4.7 4.3 Electroclean 0.1 0.2 0.2 0.2 0.2 Black Oxide 1.1 1.2 2.1 1.7 1.5 Chromate/Chromate Conversion 0.5 0.5 0:8 0.5 0.5 Magnesium Dichromate 0.0 0.0 ------0.0 Cermet/Cermet Coating 1.4 1.6 2.7 2.5 1.9 Electrostrip Chromium 0.1 0.1 0.1 0.1 0.1 Silver Strip 0.2 0.2 0.3 0.3 0.2 Strip Nickel-Nickel-Cadmium 0.1 0.1 0.2 0.1 0.1 Strip Cadmium Plate 0.1 0.1 0.1 0.1 0.2

TABLE 2

J79/LM1500 ENGINE MDR ANALYSIS

(PERCENT OF ENGINE STANDARD HOURS TOTAL)

CLASSIFIED BY LAGTAB SEGMENTS

Page 3 of 6

LAG	TAB SEGMENT / DESCRIPTION	J79-8B/C/D	J79-10	J79-10A	J79-10B	LM1500
06	Parts Processing (cont.)					
	Strip	0.0	0.0	0.0	0.0	0.0
	Strip Lead	0.0	0.0	0.1	0.0	0.0
	Metal Spray	0.2	0.1	0.1	0.1	0.2
	Plazma Spray	0.4	0.4	0.7	0.6	0.5
	Plazma Spray - Tungsten Carbide	0.1	0.1	0.1	0.1	0.1
	Plazma Spray - Molybdenum		0.0		0.1	
	Moly Coat		.0.0			
	Plate					0.0
	Chrome Plate/Hard Chrome Plate	1.0	0.8	1.4	1.1	1.4
	Electroplate Nickel	2.6	2.9	3.6	3.0	2.4
	Silver Plate	0.3	0.4	0.7	0.6	0.5 .
	Selective Electro-Deposition	0.9	1.3	1.6	1.4	1.2
	Cadmium Plate		0.0			
	Diffused Nickel-Cadmium Plate	0.1	0.2	0.3	0.2	0.2
	Tin-Cadmium Plate	0.0	0.0	0.0	0.0	0.0
	CODEP	0.4	0.5	0.4	0.8	0.5
	Laquer, Glossy	0.0				
	Polyurethane	0.0	0.0	0.0	0.0	0.0
	Silicone Resin Paint	0.5	0.4	0.7	0.6	0.6
	Special Coating	0.0	0.0	0.0	0.0	0.0
	Sub-Total	$\overline{23.9}$ 23.9	25.5 25.5	30.1 30.1	28.6 28.6	25.4
07	Machines		545 =			
	Bore	0.1	0.1	0.3	0.2	0.2
	Contour	0.0		0.1		
	Cut	0.1	0.2	0.2	0.1	0.1
	Drill .	3.0	1.2	1.0	0.7	0.9
	Face/Drill/Tap				0.4	
	Grind	4.2	3.8	4.0	3.6	4.4
	Groove	0.0				
	Hone	0.0				

TABLE 2

J79/LM1500 ENGINE MDR ANALYSIS

(PERCENT OF ENGINE STANDARD HOURS TOTAL)

CLASSIFIED BY LAGTAB SEGMENTS

Page 4 of 6

LAG	TAB SEGMENT DESCRIPTION		J79-8B/C/D	J79-10	J79-10A	J79-10B	LM1500
07	Machines (cont.) Lap Machining Mill Ream Reface Slot Tap Turn	Sub-Total	0.8 3.0 0.1 0.3 0.3 0.1 0.0 0.0	0.8 2.9 0.1 0.3 0.3 0.0 0.1 9.6 9.6	1.0 0.3 0.1 0.5 0.1 0.0 0.1 7.7 7.7	0.9 3.1 0.1 0.4 0.2 0.0 0.1 9.9 9.9	0.7 1.8 0.1 0.3 0.2 0.0 0.1 8.7 8.7
80	Accessories Processing Process Recondition	Sub-Total	0.2 5.7 5.8 5.8	0.2 6.7 6.9 6.9	0.3 4.3 4.6 4.6	0.2 5.1 5.4 5.4	0.2 6.9 7.1 7.1
10	Compressor and Turbine Balance	Sub-Total	$\frac{0.7}{0.7}$ 0.7	0.8	0.0	==	1.0
13	CER & Minor Repair Adjust Assembly Blend Build-Up Bush Chase Threads Check Cold Stack-up Dress Fill		0.1 12.1 1.1 0.2 0.0 0.1 1.3 1.6 0.5	0.1 10.1 1.3 0.5 0.1 0.0 1.4 1.8 0.6 0.0	0.0 7.2 1.5 0.0 0.1 0.6 	6.8 2.0 0.1 0.1 0.4	12.4 1.3 0.3 0.1 3.0 2.2 0.7

TABLE 2

J79/LM1500 ENGINE MDR ANALYSIS

(PERCENT OF ENGINE STANDARD HOURS TOTAL)

CLASSIFIED BY LAGTAB SEGMENTS

Page 5 of 6

LAG	TAB SEGMENT / DESCRIPTION	J79-8B/C/D	J79-10	J79-10A	J79-10B	LM1500.
13	CER & Minor Repair (cont.)					
	Fit	0.4	0.3	0.4	0.7	0.5
	Flush	0.6	0.7	0.9	0.8	0.6
	Hoist	0.1	0.1	0.1	0.1	0.1
	Incorporate Change/Modify	0.8	0.8	0.8	0.6	0.5
	Inspect	0.0	0.0	0.0	0.0	0.0
	Install	1.7	1.7	2.3	2.3	1.5
	Lubricate	0.0	0.0	0.0	0.0	0.0
\$\$	Mate	0.1	0.1	0.1	0.1	0.1
	Measure	0.1	0.1	9 -1		
	Mesh	0.0		0.0		
	Overhaul	0.0				
	Produce	1.6	1.9	3.0	2.5	2.3
	Purge	0.4	0.4	0.7	0.5	0.4
	Rebush	0.1	0.1	0.2	0.2	0.2
	Reform	0.0	0.0	I A A A		
	Repair	7.7	8.1	8.6	7.3	6.6
	Replace	0.8	1.0	1.5	1.4	1.0
	Resize	0.2	0.3	0.4	0.4	0.3
	Retap				0.4	
	Rework	0.8	0.8	0.0	0.0	0.0
	Safety Wire	0.4	0.3	0.1	0.2	0.1
	Stake	0.0				
	Straighten	0.1	0.1	0.2	0.2	0.1
	Torque	0.0	0.0	0.0	0.0	0.0
	Un-Dress	0.2	0.3			0.3
	Sub-Tota		33.0 33.0	$\overline{29.0}$ 29.0	$\overline{27.1}$ 27.1	34.4 34.
.4	Test					
	Pressure Test	0.2	0.3	0.4	0.3	0.3
	Retest		0.4			
	Rotab	0.1				0.0

TABLE 2

J79/LM1500 ENGINE MDR ANALYSIS

(PERCENT OF ENGINE STANDARD HOURS TOTAL)

CLASSIFIED BY LAGTAB SEGMENTS

Page 6 of 6

LAGTAB SEGMENT / DESCRIPTION		J79-8B/C/	D J79-10	J79-10A	J79-10B	LM1500
14 Test (co Test Trim	ont.) Sub-Total	4.2 0.0 4.6 4.	1.8 2.5 2.5	2.5 2.9 2.9	4.3 4.6 4.6	1.6 0.1 1.9 1.9
15 Preserva Preserv Can		0.0 0.2 0.2 0.	0.0 0.2 0.2 0.2	0.0	0.0	0.0 0.2 0.3 0.3
	Grand Total	100.0	100.0	100.0	100.0	100.0

SECTION IV

LAGTAB SEGMENT ANALYSIS

General

For approximately 10 years, the LAGTAB system has been in use at the East Coast NAVAIREWORKFACS. LAGTAB is an acronym for Local Analysis Grouped and Tabulated for Apportionment of Budgets. LAGTAB is a data collecting and reporting system relating the facility organizational structure to identify the type of work performed. In a sense, the LAGTAB system was a forerunner of the cost driver approach to improving productivity through the application of manufacturing technology. The LAGTAB system focuses primarily on:

- Showing expended cost trends
- Identifying modification costs for specific technical directives
- Providing a basis for negotiation of workload standards for major workload programs.

The LAGTAB system classifies the work to be done into various segments.

Aircraft rework

Work performed for the aircraft rework program is classified by assignment of each performing shop to that LAGTAB element which describes the largest portion of that shop's work. The aircraft LAGTAB segments were as follows:

- 01 Examination & Evaluation Service Groups
- 02 Disassembly
- 03 Strip; clean; corrosion treat
- 04 Fuselage, Metal Repairs
- 05 Assembly
- 06 Prime & Paint
- 07 Ground Check & Flight Test
- 08 Components, Electronics A
- 09 Components, Mechanical B
- 10 Components, Metal C
- 11 Components, Engines D
- 12 Components, Instruments E
- 13 Technical Data

Table 3 is the listing of shops by aircraft LAGTAB segment at NAVAIREWORKFAC Jacksonville. A review of this listing will show that there is a similarity though not an exact correlation, with the listing chosen for the basic cost driver study. LAGTAB, nonetheless, is a reporting system which has been in existence for a number of years and did provide a ready data base for use in making comparisons by this study.

The rework classified by LAGTAB segments has been converted to percentages of TMS aircraft total and is given in Figure 11. Work performed under Depot Level Maintenance (DLM), Standard Depot Level Maintenance (SDLM), and Mid-Term has been covered. It should be noted that Mid-Term maintenance covers that work performed at an interim time between SDLM availabilities. Mid-Term maintenance primarily involves

TABLE 3

AIRCRAFT LAGTAB SEGMENTS

NAVAIREWORKFAC JACKSONVILLE

	Description	Shop No.	Shop Title
01	E & E-Service Groups	(none given)	
02	Disassembly	(none given)	
03	Strip, Clean, Corr. Treat	93112	A/C Stripping & Corrosion
04	Fuselage, Metal		
	Repairs	95111 95112 95221	Sheet Metal-Rework Sheet Metal-Rework Sheet Metal-Mod. &
		332	Repair
		95611	Sheet Metal-Rework
		95612	Sheet Metal-Rework
05	Assembly	95141	Eng, Fuel, Oil & Hydraulics
		95142	Eng, Fuel, Oil & Hydraulics
		95144	Flt Controls & Fixed Equipment
		95145	Flt Controls & Fixed Equipment
		95171	Electrical Installation
		95172	Electrical Installation
		95175	Electrical Installation
		95222	Elec/Electronic Mod. & Repair
		95223	Mechanical Mod. & Repair
		95641	<pre>Eng. Fuel, Oil & Hydr- aulics</pre>
		95642	Eng, Fuel, Oil & Hydr- aulics
		95643	Flt. Controls & Fixed Equipment
		95644	Flt. Controls & Fixed Equipment
		95671	Electrical Installation
		95672	Electrical Installation

		95675	Electronic Installation
06	Prime and Paint	93116	A/C Finish
07	Ground Ck &		
07	Flight Test	95245	Ground & Flight Check
	1119	95246	Ground & Flight Check
08	Components,		
0.0	Electronics A	94241	Integrated Electronics
		94242	Electronics
		94243	Radar
		94244	Countermeasures
		94461	Cal. Lab-Osc., Meters Etc.
		94462	Cal.Lab-Sig. Genrs, IFF, Etc.
		94463	Electro-Mechanical
			Support Equip.
		94464	Industrial Instruments
09	Components,		
inve	Mechanical B	93111	Component Strip & Clean
		93112	A/C Stripping & Corro-
		93113	Metal Treating
		93115	Component Finish
		93116	A/C Finish
		93151	A/C Preservation
		93152	Engine Preservation
		93154	Packaging
		93155	Fabric
		93156	Rubber
		93211	Flight Controls & Subassemblies
		93212	Landing Gear
		93215	Ejection Seat
		93216	Ejection Seat Pan
		93217	Oxygen
		93218	Carbon Dioxide & Nitrogen
		93221	Hydraulic-Pumps
		93222	Hydraulic-Valves
		93223	Propeller
		93224	Control Cables
		93225	Constant Speed Drive

		93226 93227	Bearing A/C GSE
		93228	Voyage Repair Team
10	Components,		
	Metal C	93321	Layout & Sheet Metal
		93322	Tube & Hose Mfg.
		93323	Welding
		93324	Heat Treat
		93325	Pattern, Forge & Foundry
		93327	Cabin Encl. & Plastics
		93331	Sheet Metal - Large Sur- faces
		93332	Sheet Metal - Small Sur- faces
		93333	Sheet Metal - Cowling & Small Parts
		93334	Sheet Metal - A-7 Apr. Repair
		93335	Sheet Metal - Tank & Heat Exch.
		96411	Lathes
		96412	Mills
		96413	Drills
		96414	Grinders
		96415	Tool Manufacturing
11	Components,		
27-7-7-1-	Engines D	96101	R-1820 Engine Repair/
			Overhaul
		96102	J-52 Engine Repair/ Overhaul
		96103	TF-41 Engine Repair
		96104	Other Engine Repair
		96105	Engine Test
		96106	Engine Preservation
		96107	Comp/Turbine & Engine Metal Repair
		96108	Engine Disassembly
		96223	Cleaning
		96224	Welding
		96225	Plating/Plasma
		96226	Paint
		96232	Non-Destruct Exam- Engines/Aircraft
		96233	Non-Destruct Exam-Engines
		96234	Non-Destruct Exam-Aircraft
		96235	Cylinder & Piston
		96351	Carburetors
		96352	<pre>Hyd. Gear Box, Bearing & Fuel Control</pre>
		96353	Fuel Controls Disassy, Clean & Preservation

12	Components,		
	Instruments E	94111	Navigation & Flight Control
		94112	Class 100 Clean Rooms
		94113	Electro-Mechanical Instruments
		94114	Gyros & Controls
		94115	Air Data & Electronic Instruments
		94116	Stable Platform & Camera Mounts
		94117	Fire Control Equipment
		94118	Cameras & Optical
		94119	Graphic Arts
		94121	Seal
13	Technical Data	(none given)	

FIGURE 11
AIRCRAFT LAGTAB SEGMENTS
(PERCENT)

LAG	TAB SUB-PROGRAM			DLM/SDLM		MID-	TERM
SEGI	MENT/ AIRCRAFT CRIPTION	A-7B	A-7E	P-3A	P-3C	A-7A/B	A-7C/E
01	EXAM & EVAL	5.7	6.5	7.1	8.7	8.2	7.0
02	DISASSEMBLY	-	-		_	-	_
03	STRIP/CLEAN/ CORR, TREAT	4.1	5.0	5.6	7.7	14.1	22.7
04	FUSELAGE & METAL REPAIRS	12.5	13.7	29.6	20.2	5.2	4.7
05	ASSEMBLY	36.0	33,4	20.0	21.1	20.0	22.6
06	PRIME & PAINT	5.6	6.1	8.7	10.9	23.7	24.5
07	GROUND CK & FLIGHT TEST	8.6	7.5	7.4	9.3	16.9	5.9
80	COMPONENTS, ELECTRONICS A	4.4	4.6	1.5	3.2	4.2	2.2
09	COMPONENTS, MECHANICAL B	9.9	9.7	10.3	9.3	7.3	8.1
10	COMPONENTS, METAL C	9.5	8.6	6.4	8.0	0.2	1.1
11	COMPONENTS, ENGINES D	1.2	1.8	3.1	1.1	0.1	0.4
	COMPONENTS, INSTRUMENTS E	2.3	3.1	0.3	0.5	0.1	0.8
13	TECH DATA	-	_	_	_	-	_

corrosion control and incorporation of specific changes.

It is a much shorter period of depot availability than that required for SDLM. Under these premises, the "cost drivers" by aircraft LAGTAB segment were:

DLM/SDLM

A-7

- 1. Assembly
- 2. Fuselage & Metal Repairs
- 3. Components, Mechanical B
- 4. Components, Metal C
- 5. Ground Check & Flight Test

P-3

- 1. Fuselage & Metal Repairs
- 2. Assembly
- 3. Components, Mechanical B
- 4. Prime & Paint
- 5. Ground Check & Flight Test

Mid-Term

A-7

- 1. Prime & Paint
- 2. Assembly
- 3. Strip/Clean/Corrosion Treat
- 4. Ground Check & Flight Test
- 5. Components, Mechanical B

Engine rework

Work performed for the engine rework program is classified by assignment of each performing shop to that LAGTAB element which describes the largest portion of that

shop's work. Engine LAGTAB segments are tailored to recognize the type-model-series (TMS) of engines reworked at that particular NAVAIREWORKFAC. For this study, the engine data of NAVAIREWORKFAC Jacksonville were analyzed. The engine LAGTAB segments at NAVAIREWORKFAC Jacksonville were as follows:

- 01 Examination and Evaluation
- 02 Induction, Disassembly
- 03 Cleaning
- 04 Non-Destructive Testing
- 05 Examination & Routing
- 06 Parts Processing
- 07 Machines
- 08 Accessories Processing
- 09 Cylinder and Piston
- 10 Compressor and Turbine
- 11 R1820
- 12 J52
- 13 CER and Minor Repair
- 14 Test
- 15 Preservation
- 16 Process and Manufacturing Division
- 17 Avionics Division
- 18 Weapons Division

Table 4 is the listing of shops by engine LAGTAB segment at NAVAIREWORKFAC Jacksonville. It should be noted that only performing shops are listed. Other LAGTAB segments at the section, branch or division organization level are not listed.

TABLE 4

ENGINE LAGTAB SEGMENTS

NAVAIREWORKFAC JACKSONVILLE

	Description	Shop No.	Shop Title
02	Induction, Dis- assembly	96108	Engine Disassembly
03	Cleaning	96223	Cleaning
04	Non-Destructive Testing	96232	Non-Destruct Exam- Engines/Aircraft
		96233	Non-Destruct Exam- Engines
		96234	Non-Destruct Exam- Aircraft
06	Parts Processing	96224 96225 96226	Welding Plating/Plasma Paint
07	Machines	96411 96412 96413 96414 96415	Lathes Mills Drills Grinders Tool Mfg.
08	Accessories		
	Processing	96351 96352	Carburetors Hyd. Gear Box, Bearing & Fuel Control
		96353 96356	Fuel Controls Fuel Controls Disassem, Clean & Preservation
09	Cylinder & Piston	96235	Cylinder & Piston
10	Compressor & Turbine	96107	Comp/Turbine & Eng. Metal Repair
11	R1820	96101	R-1820 Engine Repair/Over-
12	J-52	96102	haul J-52 Engine Repair/ Overhaul
13	CER & Minor Repair	96103 96104	TF-41 Engine Repair Other Engine Repair

14 Test 96105 Engine Test

15 Preservation 96106 Engine Preservation

(N.B. Other segments at Section, Branch or Division level)

The same general degree of correlation between the basic MT study cost driver segments and the LAGTAB segments exists among the engine segments as was noted for the aircraft segments.

The engine rework classified by LAGTAB segments has been converted to percentages and is given in Figure 12. The two depths of rework noted are overhaul and supply repair. Overhaul rework is the more comprehensive, and requires a larger investment of labor and material than does supply repair type of rework. For purposes of comparison, the overhaul rework identified in the T56 and J79/LM1500 MDR analysis has been grouped as much as possible to conform with the J52, R1820, TF34 and TF41 engine LAGTAB segments already established. Under these premises, the highest cost engine LAGTAB segments were:

• Overhaul

J52

- 1. Machines
- 2. Process and Manufacturing Division
- 3. Accessories Processing
- 4. Parts Processing
- 5. Compressor and Turbine

R1820

- 1. Machines
- 2. Parts Processing
- 3. Cylinder and Piston
- 4. R1820
- 5. Process and Manufacturing Division

FIGURE 12

ENGINE LAGTAB SEGMENTS
(PERCENT OF ENGINE STANDARD HOURS TOTAL)

SUB-PROGRAM				OVER	HAUL					(SUPPLY)	REPAIR	
LAGTAB SEGMENT/ DESCRIPTION ENGINE	J52	R1820	T56	J79- 8B/C/D	J79- 10	J79- 10A	J79- 10B	LM1500	J52	R1820	TF 34	TF 41
01 EXAMINATION & EVALUATION	3,5	2.8	3.2	2.5	2.1	1.8	2.3	1.2	4.4	3,3	8.4	8.2
02 INDUCTION & DISASSEMBLY	5.9	4.3	10.8	7.9	9.0	5.8	5.3	4.9	2.6	1.3		
03 CLEANING	6.3	6.0	2.2	6.2	7.2	14.0	13,4	11.9	3.8	3.0	1.4	1.8
04 NON-DESTRUCTIVE TESTING	5.3	3.4	2.8	1.6	1.9	2.1	2.1	1.9	3.1	2.3	3,5	1.1
05 EXAMINE & ROUTE				1.3	1.3	2.0	1.5	1.4				
06 PARTS PROCESSING	10.8	15.5	10.9	23.9	25.5	30.1	28.6	25.4	7.0	10.3		2.4
07 MACHINES	16.3	23.0	22.4	12.1	9.6	7.7	9.9	8.7	12.7	8.9	3,0	5.0
08 ACCESSORIES PROCESSING	. 14.6	5.4	2.1	5.8	6.9	4.6	5.4	7.1	11;1	10.2	0.1	2.
09 CYLINDER & PISTON		12.1								15.4		
10 COMPRESSOR & TURBINE	9.9	5.4	1.5	0.7	0.8	0.0		1.0	11.5	0.9	3,3	13.
11 R1820		9.8								31.1		
12 J52	7.7								25.2			
13 CER & MINOR REPAIR			36.8	33.2	33.0	29.0	27.1	34.4			57.9	47.
14 TEST	5.0	3.6	7.2	4.6	2.5	2.9	4.6	1.9	8.2	5.2	9.8	11.
15 PRESERVATION	0.9	1.5	0.1	0.2	0.2	0.0	0.0	0.3	1.4	. 4.2	6.2	2.
16 PROCESS & MFG DIVISION	13.7	7.3							9.0	3.9	6.5	3.
17 AVIONICS DIVISION												
18 WEAPONS DIVISION												
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.

DATA SOURCE:

⁻ NAVAIREWORKFAC JACKSONVILLE ENGINE STATUS REPORT: J52; R1820; TF 34; TF 41

⁻ MASTER DATA RECORD (MDR): T56; J79; LM1500

T56

- 1. CER and Minor Repair
- 2. Machines
- 3. Parts Processing
- 4. Induction/Disassembly
- 5. Test

J79-8B/C/D

J79-10

- 1. CER and Minor Repair
- 2. Parts Processing
- 3. Machines
- 4. Induction/Disassembly
- 5. Cleaning

J79-10A/B

- 1. Parts Processing
- 2. CER and Minor Repair
- 3. Cleaning
- 4. Machines
- 5. Accessories Processing/ Induction/Disassembly

LM1500

- 1. CER and Minor Repair
- 2. Parts Processing
- 3. Cleaning
- 4. Machines
- 5. Accessories Processing
- Supply Repair

J52

1. J52

- 2. Machines
- 3. Compressor and Turbine
- 4. Accessories Processing
- 5. Process and Manufacturing Division

R1820

- 1. R1820
- 2. Cylinder and Piston
- 3. Parts Processing
- 4. Accessories Processing
- 5. Machines

TF34

- 1. CER and Minor Repair
- 2. Test
- 3. Examination and Evaluation
- 4. Process and Manufacturing Division
- 5. Preservation

TF41

- 1. CER and Minor Repair
- 2. Compressor and Turbine
- 3. Test
- 4. Examination and Evaluation
- 5. Machines

SECTION V

MACHINE TOOL UTILIZATION ANALYSIS

General

Though not the largest cost driver in NAVAIREWORKFAC operations, the use of machine tools is certainly a significant cost driver. Very detailed records are kept on numerical control machine utilization. Not as complete records are kept on conventional machine utilization. However, through use of a unique report which is made at NAVAIREWORKFAC Jacksonville, it was possible to determine the relative usage of conventional and numerical control machines.

Numerical Control Machine Utilization

The utilization of each numerical control (N/C) machine at each NAVAIREWORKFAC is reported upon monthly. This N/C Machine Utilization Report includes both production and non-production time. Production time is the sum of cutting, prove-out, set-up, warm-up and clean-up times. Non-production time is the sum of no work, no operator, no tools, maintenance or other miscellaneous down times. Utilization is defined as the ratio of total production time to total scheduled time.

N/C Machine Utilization Reports were analyzed for the test period of July 1, 1977 to Dec. 31, 1977. The results of these analyses are given in Figure 13, Production Time and Figure 14, Cutting Time. The cost drivers based on either production time or cutting time were as follows:

FIG. 13

N/C MACHINE USAGE PRODUCTION TIME (% OF RESPECTIVE NAVAIREWORKFAC TOTAL) 1 JUL 77 — 31 DEC 77

	NAVAIREWORKFAC											
MACHINE/ PROCESS	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL					
LATHES	385	15.7	17.0	22.6	16.3	24.7	22.3					
DRILLS	10.3	-	4.8	12.1	6.2	12.5	8.3					
PUNCHES	2.0	3.9	_	-	3.8	3.8	2.4					
MILLS/BORING MILL	36.2	26.4	20.1	5.3	24.8	5.8	18.8					
MACHINING CENTERS	10.6	54.0	58.1	59.4	40.8	52.9	45.5					
GRINDERS	-	-	_	s - s	4.0	_	1.1					
ROUTERS	2.4		_	2 000 4	4.2		1.5					
TUBE BENDERS	_			0.6	-	0.3	0.2					
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0					

FIG. 14

N/C MACHINE USAGE CUTTING TIME (% OF RESPECTIVE NAVAIREWORKFAC TOTAL) 1 JUL 77 — 31 DEC 77

	NAVAIREWORKFAC										
MACHINE/ PROCESS	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL				
LATHES	43.7	16.2	16.3	21.8	12.5	28.1	21.9				
DRILLS	8.8	====	0.7	12.4	7.4	13.6	8.2				
PUNCHES	2.6	3.1	-	-	3.8	3.7	2.4				
MILLS/BORING MILL	33.0	26.8	15.3	5.6	28.8	6.4	19.4				
MACHINING CENTERS	. 9.3	53.9	67.7	60.0	39.4	47.9	45.4				
GRINDERS	_	# = T	-		3.1		0.9				
ROUTERS	2.6	_	-	_	5.0	- =	1.8				
TUBE BENDERS				0.2		0.2	0.1				
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0				

- 1. Machining center operations
- 2. Turning
- 3. Milling
- 4. Drilling
- 5. Punching

Significantly greater detail is available in Figures A-31 through A-52 contained in Volume II - Addendum of this report.

Conventional Machine Usage

NAVAIREWORKFAC Jacksonville has consolidated all machine tool operations within a single shop. Machine tools performing similar functions are grouped together in the same geographical area. This geographical area is specified by a code on all pre-printed work orders or operating documents which originate from master data records (MDRs). Both conventional and numerical control machine operation data is sorted at NAVAIREWORKFAC Jacksonville by this geographical area code and is displayed in the geographical area report. This report is made in addition to the N/C machine utilization report. By comparing data from the N/C machine utilization report and the geographical area report, some conclusions regarding the relative uses of N/C and conventional machine tools can be made. The "cutting time" in the N/C machine utilization report is generally comparable to the "expended time" in the geographical area report.

The master data records (MDRs) identify the geographical area code which applies to that machine work

specified on the MDR. Thus, for all work done as directed by an MDR, the machine hours expended are collected in the geographical area report. However, some work is done under a Planning Manufacturing Order (PMO) system which parallels the MDR system. The PMO system, also known as "hand-writes", is directed by the production planners to meet a specific requirement. The shop geographical area code is not usually on the PMO. For this reason, the expended hours on the geographical report will be less than the cutting time on the N/C machine utilization report. To determine how much this understatement of use might be, an equipment utilization study of August 1972 was reviewed. During the four month base period in 1972, 20% of the total machine hours expended, both conventional and numerical control, were done to satisfy PMOs. Assuming that the division of effort in 1977 was comparable to that experienced in 1972, the N/C machine expended hours on the geographical area report were factored by dividing by 0.80 (i.e. 1-0.20). The quotient was comparable to the cutting hours reported for the same period on the N/C machine utilization report. Thus, the applicability of the geographical area report was confirmed. The results of this analysis are given in Figure 15. For NAVAIREWORKFAC Jacksonville, the conventional machine "cost drivers" for the test period were:

- 1. Grinding
- 2. Turning

- 3. Drilling
- 4. Milling
- 5. Electrical Discharge Machining

6

FIGURE 15

MACHINE USAGE (PERCENT) NAVAIREWORKFAC JACKSONVILLE 1 JUL 77 — 31 DEC 77

MACHINE/	CONVENTIONAL	NTIONAL NUMERICAL CONTROL				
PROCESS	EXPENDED TIME 2	EXPENDED TIME 2	PRODUCTION TIME 1	CUTTING TIME 1		
LATHES/AUTOMATIC BAR MACHINE	29.2	15.6	17.0	16.3		
AUTOMATIC SCREW MACHINES	0.6	-	-	(-):		
DRILLS	9.4	4.5	4.8	0.7		
BORERS/BORING MACHINE	0.4	<u> </u>	-	-		
HONES	2.8	-		,=,		
GRINDERS	40.6		=	-		
ELECTRICAL DISCHARGE MACHINES	3.3		-	-		
ELECTRON BEAM WELDERS	2.3	-	-	-		
MILLS/BORING MILL	6.6	14.2	20.1	15.3		
MACHINING CENTERS	-	65.7	58.1	67.7		
PLANER	-	_	-			
SHAPERS	-	-	-	-		
BROACH	0.1	-	n=0	-		
DEBURRING MACHINE	2.9	:=:	:-	-		
LAPPING MACHINE	. 0.1		-	-		
HANDWORK	1.8	F_3	_			
TOTAL	100.1	100.0	100.0	100.0		

¹ N/C MACHINE UTILIZATION REPORT

² GEOGRAPHICAL AREA REPORT

SECTION VI

PRODUCTION SHOPS SURVEY

One of the primary objectives of this manufacturing technology cost drivers study was to identify and quantify the specific processes used in the aircraft rework, overhaul and remanufacture industrial operation. After thoroughly investigating all existing recurring reports, it was determined that none of them contained data to the level of detail desired. To obtain these data, it was necessary to survey the direct labor cost driver shops in the "top seven" MT functional categories as given in Figure 4. The production shops surveyed at each of the NAVAIREWORKFACS are given in Tables 5 through 10, and reflected the shops organization at the end of 1978. As stated earlier, the direct labor cost drivers are generally susceptible to MT improvements at the NAVAIREWORKFAC itself, whereas the direct material cost drivers are generally responsive to improvement efforts initiated by the material acquisition manager. For this reason, direct labor cost drivers were concentrated upon for the production shop survey.

For each of the "top seven" MT functional categories, individual shop survey forms were prepared and distributed to the applicable shops. The first line supervisor for each shop was requested to estimate the time spent on performing each of the elemental operations listed on the form. Additional elemental operations not already listed but being

DIRECT LABOR COST DRIVER SHOPS

NAVAIREWORKFAC ALAMEDA

ELECTRICAL/ELECTRONIC

94111	Instrument Pre-Processing
94112	Pressure Flight Instruments
94113	Graphic Arts
94114	Electro-Mechanical Electronics
94121	Indicators & Controls
94122	Navigational Components
94123	Computers & Instruments
94124	Flight Control Components
94131	Flight Gyroscope
94132	Vertical Gyroscope
94133	Gyroscope Platform
94212	Electrical/Electronics Interfacing
94213	Process/Test and Electrical Components
94216	Power Generating/Control Systems
94217	Electro-Mechanical Drive/Conversion Devices
94321	Electronic Warfare
94322	VAST/HATS/SACE Avionics
94323	RADAR
94324	IFF and Navigation
95322	Structural/Electrical Rework

DISASSEMBLE/ASSEMBLE

Missile Induction/Canning
Missile Component Rework
A/C Component Removal (A6)
A/C Mechanical/Electrical Installation & Test (A6)
A/C Component Removal (S3)
A/C Component Removal (P3/C118)
A/C Electrical/Mechanical Installation & Test
(P3/C118)
A/C Disassembly (S3)
A/C Disassembly (A3)
Assembly T56)
Assembly (J52)
Gearbox
Assembly (TF34)
Assembly (TF41)
Disassembly, Minor Repair, CER (TF30)
Examination & Route

SHEET METAL 93111 Cowling, Miscellaneous Parts 93112 Tanks 93113 Wings & Stabilizers Metal Manufacturing 93142 Sub-Assembly Heat Treat 93143 Structural/Electrical/Mechanical Rework 95323 95422 Repair/Modification Metal 96217 TESTING SPARROW Guidance Test 94221 SPARROW Control Test 94222 SPARROW Modification/Systems Test 94223 SHRIKE/ BULLPUP Test 94226 PHOENIX Test 94227 94325 ATE and Module Repair 95333 Final Systems Test 95334 Pre-Flight (P3/A3/C118) Engine Test (J52, J65, T56, TF34, TF41, TF30, J57) 96234 MACHINING 93131 Tool & Die N/C Machine 93132 Lathe & Auto Machine 93133 93134 Grinder & Drill Mills 93135 Heavy Metal Fabrication 93137 Lathe 96311 Mill 96312 96313 Drill 96314 Grind HYDRAULIC/PNEUMATIC Pumps &CSD & Mechanical Components 93124 Cylinder Valve & Auto Flight Control 93125 96321 Pumps Engine Controls 96322 96323 Ignition 96324 Fuel System Accessories Pump & Controls 96325 Regulators 96326 Drive & Test 96331 Turbine 96332

96333

96336 96337 GTC

Valves

Disassembly

STRIP/FINISH/PAINT

93215	A/C Paint West
93216	A/C Paint East
93217	Parts Paint
93221	A/C Stripping

DIRECT LABOR COST DRIVER SHOPS

NAVAIREWORKFAC CHERRY POINT

ELECTRICAL/ELECTRONIC

94101	Instruments .
94102	Guidance & Stabilization
94105	Electric Battery
94205	Communication, Navigation & Identification
94206	RADAR/Fire Control
95102	A/C Rework Shop
95103	A/C Rework Shop
95104	A/C Rework Shop
95105	A/C Rework Shop
95107	A/C Rework Shop
95201	A/C Rework Shop
95202	A/C Rework Shop
95205	A/C Rework Shop
95207	A/C Rework Shop
95301	A/C Rework Shop
95302	A/C Rework Shop
95304	A/C Rework Shop
95305	A/C Rework Shop
95306	A/C Rework Shop
95402	A/C Rework Shop
95403	A/C Rework Shop
95404	A/C Rework Shop
95405	A/C Rework Shop
95406	A/C Rework Shop
95407	A/C Rework Shop
	94105 94205 94206 95102 95103 95107 95202 95207 95202 95205 95207 95301 95302 95304 95306 95403 95403 95404 95405 95406

DISASSEMBLE/ASSEMBLE

94403	Disaggemble: C Devices
	Disassembly & Rework
95101	A/C Rework/Preservation & Salvage
95102	A/C Rework Shop
95103	A/C Rework Shop
95105	A/C Rework Shop
95106	A/C Rework Shop
95107	A/C Rework Shop
95201	A/C Rework Shop
95202	A/C Rework Shop
95203	A/C Rework Shop
95205	A/C Rework Shop
95206	A/C Rework Shop
95207	A/C Rework Shop
95301	A/C Rework Shop
95302	A/C Rework Shop
95304	A/C Rework Shop

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A/C Rework Shop
    95305
                 A/C Rework Shop
    95306
                 A/C Rework Shop
    95401
                 A/C Rework Shop
    95402
                 A/C Rework Shop.
    95403
                 A/C Rework Shop
    95404
                 A/C Rework Shop
    95405
                 A/C Rework Shop
    95406
    95407
                 A/C Rework Shop
                 Disassembly Reclamation
    96105
                 Parts Repair
     96107
                 Engine Assembly, Repair & Test (T-76)
     96201
                 Engine Assembly, Repair & Test (T-58)
     96202
                 Engine Assembly, Repair & Test (J-79)
     96204
                 Engine Assembly, Repair & Test (F-402
     96206
                  Pegasus)
                 Fuel/Oil/Hydraulic Accessories Disassembly
     96301
                 Fuel/Oil/Hydraulic Accessories Assembly
     96302
                 Fuel Controls/Fuel Gallery Assembly & Rework
     96305
                 Propellers, Transmissions & Gear Boxes
     96308
                 Rotor & Balancing
     96309
SHEET METAL
                  Tanks, Tubing, Hose & Parts Repair
     93201
                  Survival Equipment
     93202
                  Large & Small Surfaces
     93204
                  Aluminum Manufacture & Repair
     93207
                  Steel Manufacture, Foundry & Heat Treat
     93209
                  Support Equipment
     93305
                  A/C Rework Shop
     95102
                  A/C Rework Shop
     95104
                  A/C Rework Shop
     95107
                  A/C Rework Shop
     95201
                  A/C Rework Shop
     95202
                  A/C Rework Shop
     95204
                  A/C Rework Shop
     95205
                  A/C Rework Shop
     95206
                  A/C Rework Shop
     95207
                  A/C Rework Shop
     95301
                  A/C Rework Shop
     95302
                  A/C Rework Shop
     95303
                  A/C Rework Shop
      95304
                  A/C Rework Shop
      95305
                  A/C Rework Shop
      95306
                  A/C Rework Shop
      95307
                  A/C Rework Shop
      95402
```

95403 95404 95405 95406 95407 96107 96207	A/C Rework Shop Parts Repair Preservation & Packaging
TESTING	•
94207	Automatic Test Equipment Utilization
94404	Gas Turbines
95210	Ground Check/Flight Test
96201 96202	Engine Assembly, Repair & Test (T-76)
96204	Engine Assembly, Repair & Test (T-58) Engine Assembly, Repair & Test (J-79)
96206	Engine Assembly, Repair & Test (F-402 Pegasus)
96303	Fuel/Oil/Hydraulic Accessories Test
MACHINING	
93301	Machine Manufacture
93302	Machine Rework
94403	Rotary Blade Rework
95101	A/C Rework/Preservation & Salvage Machine
96106	Machine
HYDRAULIC/PNEU	MATIC
93303	Hydraulic
94401	Valves, Regulators & Accessories
94402	Starters & Turbines
94403	Disassembly & Rework
94404 94406	Gas Turbines Air Turbine Motors
94400	All luibline Motors
STRIP/FINISH/P	AINT
93101	A/C Strip & Clean
93104	Components Painting & Cleaning
93107	A/C Paint & Corrosion Control
93401	Rotary Blade Rework
96103	Paint
96207	Preservation & Packaging

DIRECT LABOR COST DRIVER SHOPS

NAVAIREWORKFAC JACKSONVILLE

ELECTRICAL/ELECTRONIC

93532	Rotating Electric
93534	Components .
94111	Navigation & Flight Control
94112	Class 100 Clean Rooms
94113	Electro-Mechanical Instruments
94114	Gyros & Controls
94115	Air Data & Electr. Instruments
94116	Stable Platform & Camera Mounts
94117	Fire Control Equipment
94118	Cameras & Optical
94121	Seal
94241	Integrated Electronics
94242	Electronics
94243	RADAR
94244	Countermeasures
95171	Electrical Installation
95172	Electrical Installation
95175	Electronic Installation
95222	Electrical/Electronic Modification & Repair
95671	Electrical Installation
95672	Electrical Installation
95675	Electronic Installation

DISASSEMBLE/ASSEMBLE

95141	Engine, Fuel, Oil & Hydraulics
95142	Engine, Fuel, Oil & Hydraulics
95641	Engine, Fuel, Oil & Hydraulics
95642	Engine, Fuel, Oil & Hydraulics
96101	R-1820 Engine Repair/Overhaul
96102	J-52 Engine Repair/Overhaul
96103	TF-41 Engine Repair
96104	Other Engine Repair
96108	Engine Disassembly

SHEET METAL

93321	Layout & Sheet Metal
93322	Tube & Hose Manufacturing
93331	Sheet Metal - Large Surfaces
93332	Sheet Metal - Small Surfaces
93333	Sheet Metal - Cowling & Small Parts

93334	Sheet Metal	-	A-7 APR Repair
93335	Sheet Metal	_	Tank & Heat Exchangers
95111	Sheet Metal	_	Rework
95112	Sheet Metal	-	Rework
95221	Sheet Metal	-	Modification & Rework
95611	Sheet Metal	_	Rework
95612	Sheet Metal	_	Rework

TESTING

95245	Ground & Flight	Check		
95246	Ground & Flight	Check		
96105	Engine Test			
96232	Non-Destructive	Examination	- Engines	& Aircraft
96233	Non-Destructive	Examination	- Engines	
96234	Non-Destructive	Examination	- Aircraft	

MACHINING

96411	Lathes
96412	Mills
96413	Drills
96414	Grinders
96415	Tool Manufacturing

HYDRAULIC/PNEUMATIC

93221	Hydraulics - Pumps
93222	Hydraulics - Valves
93225	Constant Speed Drive

STRIP/FINISH/PAINT

93111	Component Strip & Clean
93112	Aircraft Stripping & Corrosion
93115	Component Finish
93116	Aircraft Finish
94119	Graphic Arts
96226	Paint

DIRECT LABOR COST DRIVER SHOPS

NAVAIREWORKFAC NORFOLK

ELECTRICAL/ELECTRONIC

93113	Electrical Installations & Prototype
93142	Electrical Launch & Recovery Systems
94121	Inertial Platforms
94122	Gyros
94123	Accelerometers & Missile Seeker Heads
94124	Electrical Instruments, Photo & Optical
94125	Gyros
94126	Automatic Pilots & Mechanical Gyros
94211	RADAR
94212	Navigational Systems
94213	Computer
94214	ASW, EMC & IFF
94215	Support & Avionics Bearings
94221	SACE
94222	Module/CNI
94224	VAST/AWM-23/AWG-9
94226	VAST/AWM-23/AWG-9 Maintenance & Calibration
94311	Rotating & Controls
94313	Subassembly
95212	A/C Rework & Mod-Electrical & Electronic
95222	A/C Rework & Mod-Electrical & Electronic
94224	A/C Rework & Mod-Electrical & Electronic
95323	A/C Rework & Mod-Electrical & Electronic
95324	A/C Rework & Mod-Electrical & Electronic

DISASSEMBLE/ASSEMBLE

95112	A/C Rework & Operational Check
95113	A/C Rework & Operational Check
95211	A/C Rework & Modification - Airframes
95215	A/C Rework & Modification - Airframes
95221	A/C Rework & Modification - Airframes
95225	A/C Rework & Modification - Airframes
95314	A/C Rework & Modification - Airframes
95321	A/C Rework & Modification - Airframes
95322	A/C Rework & Modification - Airframes
96111	TF-30 Repair & Final Assembly
96113	J-57 Subassembly, Repair & Final Assembly
96121	Blade & Nozzle
96122	Rotor Build & TF-30 Subassembly
96125	J-52,T-56 Overhaul & A/B Repair

96131 96134	Engine Disassembly & Buildup Gearbox Assembly, Cleaning & Closure
SHEET METAL	
93111	Large Surface Repair
93112	Subassembly & Operational Check
93114	Cabin Enclosure, Cowling & Fairing Repair
93132	Small Surface Repair
93141	Mechanical Launch & Recovery Systems
93212	Sheet Metal Manufacturing
95213	A/C Rework & Modification - Structural A/C Rework & Modification - Structural
95223 95311	A/C Rework & Modification - Structural A/C Rework & Modification - Structural
95312	A/C Rework & Modification - Structural
95313	A/C Rework & Modification - Structural
TESTING	
93235	Non-Destructive Testing
94315	Test
95121	Ground Check & Flight Test
96114	Engine Test
96143	Fuel Control Test
MACHINING	
93222	Numerically Controlled & Conventional Milling
93223	Numerically Controlled & Conventional Turning & Drilling
93224	Tool & Die Manufacturing
93231	General Machine & Line Support
96212	Lathes, Mills, Grinders & Electrical Dis- charge Machines
96213	Boring Mills & Drills, Toolmaking & Rework
96223	Metal Repair & Metallizing
HYDRAULIC/PNE	UMATIC
93133	Hydraulic
93332	Aviation Ordnance & Pneumatic Equipment
96233	Constant Speed Drives, Pumps & Bearings
STRIP/FINISH/	PAINT
93321	Primary Paint & Decalcomania Manufacture
93322	Paint (Aircraft)

DIRECT LABOR COST DRIVER SHOPS

NAVAIREWORKFAC NORTH ISLAND

ELECTRICAL/ELECTRONIC

94112	Electro-Mechanical
94115	Generators, Starters, GSE
94118	Panels & Subassemblies
94119	Control Equipment
94231	Communication
94232	Tactical Navigation
94233	RADAR, Altimeters and Misc. Systems
94234	Microminiature Manufacture and Repair
94242	Navigational and Misc. Systems
94243	ECM/ASW SONAR, RADAR
94244	E2B/SACE-SSE
94245	E2 Aircraft Tactical Check
94251	Missile Control (RADAR)
94252	Armament and Search Systems
94253	AWG-10/10A
94254	AWG-9
94255	Control Systems
95522	E-2/C-2 Flight Check
95531	Wire/Bundle Installation
95532	Wire/Splice Installation
95622	DTTMCO/Installation
95626	Electrical/Electonic Check-out
95714	Flectronic and Electrical Installation
95723	Electronic and Electrical Installation
22123	The Control of the Co

DISASSEMBLE/ASSEMBLE

93421	Parts Repair (Bulk-Partial)
95414	Fuel Cells
95416	Aft Fuselage
95431	Forward Cockpits
95432	Fuel Cells
95433	Center Aft Fuselage
95434	Wings/Misc. Repair
95533	Fuel Installation
95534	BLC and Tail
95535	Wing/Landing Gear Installation/Basic Hyd.
95623	Fixed Equipment/Refrigeration
95624	Rigging/Check-out (Even Seq.)
95625	Rigging/Check-out (Odd Seq.)
95711	Disassembly and Transmission
95714	Electrical/Electronic Installation
95715	Airframes
95721	Disassembly and Installation

95724	Misc. Metal Repair
95725	Final Assembly and Check-out
96311	Disassembly/Nut & Bolt, Shop Process Instruction (Bulk)
96315	Blade Reconditioning (Bulk)
96316	Small Engine Rework (Bulk)
96321	Shaft/Rotor Assembly and Balance (Bulk)
96322	J79/LM1500/LM2500 Subassembly
96323	J79/LM1500/LM2500 & Afterburner Assembly
96324	Minor Repair & QEC Assembly
96411	Disassembly/Exam & Routing (Bulk)
SHEET METAL	
93422	Wings & Large Surfaces
93423	Small Surfaces
93424	Metal Tanks and Ducts (Bulk-Partial)
93425	Container Repair, Engine & Afterburner, Rotor Blade, Canning/Uncanning
95412	Cockpits
95413	Compartment 1
95414	Fuel Cells
95415	Center Fuselage
95416	Aft Fuselage
95422	Wings
95423	Strap Installation
95431	
95431	Forward Cockpits Fuel Cells
95433	Center Aft Fuselage
95434	Wings/Misc. Repair
95713	Structures
95722	Fuselage Repair
95724	Misc. Metal Repair
97215	Sheet Metal
TESTING	
95416	Aft Fuselage
95431	Forward Cockpits
95432	Fuel Cells
95434	Wings/Misc. Repair
95521	F-4 Flight Check
95522	E-2/C-2 Flight Check
95523	Helo Flight Check
95714	Electrical/Electronic Installation
95724	Misc. Metal Repair
95725	Final Assembly & Check-out
96314	NDT, Exam & Routing (Bulk)
96325	Engine and Gearbox Test
96411	Disassembly/E&R (Bulk)
96414	Fuel Valves - Electical & Small Acc. Flow Test
96416	Accessories Flow Test

MACHINING

96423	Large Machine (Bulk)
96424	Small Machine
97221	N.C. Machining
97222	Lathes
97227	Grinders & Hones
97228	Drills & Mills
97232	Weapons #2 Support
97234	Weapons #1 Support
97236	Accessories Support
97237	Avionics Support
97238	Tooling Mfg.
97313	Rotor Heads
97315	Transmissions (Bulk)

HYDRAULIC/PNEUMATIC

93211	Constant Speed Drive & Flight Controls (Bulk-Partial)	
93214	Hydraulic Pumps	
93215	Misc. Hydraulic Units	
93216	Components Test	
93218	Rescue Hoists	
95535	Wing/Landing Gear Installation/Basic Hyd.	
97312	Landing Gear	

STRIP/FINISH/PAINT

96425	Paint/CODEP (Bulk)
97321	Cleaning (Bulk)
97332	Misc. Painting (Bulk)
97333	Parts Painting (Bulk)
97341	Paint Line A/C - E-2, C-2, Helo/Misc.
97342	Paint Line A/C - F-4 & Misc.
97343	Misc. Corrosion Control & Preparation for
	Paint

DIRECT LABOR COST DRIVER SHOPS

NAVAIREWORKFAC PENSACOLA

ELECTRICAL/ELECTRONIC

94301	Instrument
94302	Instrument
94303	Instrument
94304	Instrument
94305	Instrument & Bearing
94306	Instrument & Decontamination
94307	Instrument
94401	Instrument
94402	Instrument
94403	Instrument
94404	Instrument
94405	Instrument
94406	Instrument
94407	Instrument
94408	Instrument
94501	Electronic Repair
94502	Electronic Repair (UHF Comm)
94503	Electronic Repair (UHF & FM NAV Comm)
94504	Electronic Repair (NAV & Misc.)
94506	Rotating Electrical Equipment
94507	Disassembly & Cleaning
94508	Rotating Electrical Equipment
94701	Electrical
94702	Avionic Cable
95125	Minor Repair
95127	Pavelow III
95143	Battery
95148	Battery
95151	SDLM/Electrical T-2/Misc.
95152	SDLM/Electrical T-28
95221	T-2/T-33/Quick Fix/T-28 (Electrical)
95224	SDLM/A.C.I. (Electronics)
95231	SDLM/H-3 (Electrical)
95452	A-4 (Electrical)
95453	A-4 (Electrical)
95463	A-4 (Electrical)
95472	T-39 (Electrical)

DISASSEMBLE/ASSEMBLE

93309 95147 95211 95214 95215 95222 95227 95235 95454 95465 95473 96407 96508	Wings QEC A.C.I. H-3/H-53 SDLM H-53 Electrical SDLM H-53 Mechanical T-2/T-33/Quick Fix/T-28 (Mechanical) T-28 (Mechanical) SDLM H-3 Mechanical A-4 (Mechanical) A-4 (Mechanical) T-39 (Mechanical) Disassembly Cabin Enclosures
SHEET METAL	
93302 93303 93304 93407 95121 95154 95216 95232 95233 95234 95451 95461 95471 95475	Large Tanks & Heat Exchangers Large Surfaces Cowling Metal Manufacturing Minor Repair T-2/T-33/Quick Fix/T-28 (Metal) SDLM H-53 Metal SDLM H-3 Mechanical SDLM H-3 Mechanical SDLM H-3 Metal A-4 (Metal) A-4 (Metal) T-39 (Metal) T-39 (Metal)
TESTING	
93405 95131 95132 95135 95136 95137 95243	Nondestructive Testing A/C Test A/C Test A/C Electrical & Electronic Avionics Helicopter Test Helicopter Electrical & Electronics Test
MACHINING	
93501 93502 93503	Grinders Toolmaking Toolmaking

93504	Machine Support & Springs
93505	Mills
93506	Engine Lathes
93507	General Machining
93508	General Machining (third shift)
96405	Machines

HYDRAULIC/PNEUMATIC

96602	Hydraulics	&	Test
96603	Hydraulics		

STRIP/FINISH/PAINT

93601	Cleaning
93605	Paint
93606	Paint
95141	Paint
95142	Paint
95144	Paint
96504	Paint & Special Coating

performed by the shop were to be added to the form. The number of people assigned to each shop was also noted. With these input data, the equivalent number of people performing any identified MT elemental operation was determined at each NAVAIREWORKFAC and then summed for the total NAVAIREWORKFAC effort. The results of this analysis were converted to percentages and are given in Tables 11 through 17. The highest elemental cost driver operations for each of the manufacturing technology functional categories were:

Electrical/Electronic

- 1. Repair of aircraft wiring and/or equipment.
- 2. Repair.
- 3. Rework.
- 4. Overhaul.
- 5. Check or test of operational equipment.

• Disassemble/Assemble

- 1. Assemble.
- 2. Disassemble to test or check.
- 3. Disassemble to route for rework.
- 4. Disassemble to rework.
- 5. Disassemble to comply with technical directives.

• Sheet Metal

- 1. Comply with technical directives.
- Manufacture and install structural repair parts.
- 3. Remove or treat corrosion.

TABLE 11
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG <u>1</u> OF <u>3</u>

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: ELECTRICAL/ELECTRONIC

MANU. TECH	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
OPERATION							
AIRCRAFT EQUIPMENT/WIRING:							
- MODIFY	4.2	17.6	0.5	3.5	11.0	4.8	6.1
- REPAIR	29.0	9.6	2.4	10.3	17.1	11.9	13.8
- REPLACE	1.2	2.6	0.4	0.9	5.8	8.3	3.3
- INSTALL		6.7	0.3	3.6	15.0	4.6	5.4
CHECK/TEST:							
- OPERATIONAL	2.7	11.1	8.7	4.8	10.6	7.7	7.3
- DITMCO $\frac{1}{}$	1.0	3.5	2.1	1.1	2.4	1.8	1.8
- OTHER AUTOMATIC TEST EQUIPMENT 1/	0.4	1.2	4.4	8.6	3.5	0.7	3.7
CORRECT DISCREPANCIES	1.3	2.3	0.1	2.1	0.9	1.1	1.3
EVALUATE	2.4	1.4	5.5	2.1	1.7	0.2	2.2
REPAIR	3.3	7.6	13.2	15.3	4.3	10.0	9.2
REWORK	12.5	10.3	14.5	5.9	2.2	14.7	9.2
OVERHAUL	9.0	4.3	14.2	5.6	1.7	20.9	9.0
CALIBRATE	6.8	0.4	5.9	4.6	0.5	0.2	3.2
CROSS CHECK	0.1	0.3	0.8	0.4	0.3	0.0	0.3
CERTIFY	0.9	0.5	2.0	1.4	1.6	0.4	1.2
ΓEST	6.2	2.0	5.0	5.1	2.1	2.5	3.9

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TABLE 11
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG _ 2 OF _ 3

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: ELECTRICAL/ELECTRONIC

MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
DISASSEMBLE	4.2	3.7	5.1	4.4	2.6	2.1	3.7
ASSEMBLE	5.4	2.4	8.8	6.4	2.3	2.8	4.8
COMPLY WITH TECHNICAL DIRECTIVES	2.4	2.3	2.7	9.3	6.6	0.6	4.7
HERMETICALLY SEALED INSTRU- MENTS AND COMPONENTS:							
- UNSEALING	0.7	1.4	0.2	0.8	0.2	0.1	0.5
- LEAK-TESTING	0.8	0.6	0.3	0.2	0.2	1.1	0.5
- PURGING	0.2	0.5	0.3	0.3	0.0	0.3	0.2
- FILLING	0.1	0.6	0.2	0.5	0.1	0.1	0.2
- RESEALING	1.1	0.4	0.2				0.2
- FOG-TESTING	0.1		0.1	0.1	-		0.0
REFINISH:					1		
- DIALS	0.3		0.0	0.1	0.0	0.0	0.1
- POINTERS	0.2			0.0		0.0	0.0
- PANELS	0.1	1.0	0.1	0.4	0.4	0.1	0.3
- NAME PLATES	2.9	0.6	0.1	0.3	0.1	0.0	0.6
MANUFACTURE:							
- PRINTED CIRCUIT BOARDS						0.1	0.0

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TABLE 11
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG _3_ OF _3_

NAVAIREWORKFAC ANU. TECH PERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
EPAIR: - PRINTED CIRCUIT BOARDS	0.1				0.0		0.0
- MINIATURE INTEGRATED CIRCUITS		4.2	1.0	0.8	4.4	2.4	2.0
- MICRO-MINIATURE INTEGRATED CIRCUITS		0.7	0.9	0.4	2.2	0.4	0.9
NSTALL CABLING/EQUIPMENT				0.6			0.1
HOTO PROCESS	0.4						0.1
OTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0
SEE ALSO TABLE 14 - "TESTING"				*			
					,	48 12	

TABLE 12
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG <u>1</u> OF <u>1</u>

NAVAIREWORKFAC	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
DISASSEMBLE TO: - TEST/CHECK - ROUTE FOR REWORK - ACCESS OTHER PARTS/ AREAS - REPAIR - REWORK - OVERHAUL - MODIFY - COMPLY WITH TECHNICAL DIRECTIVES - TREAT CORROSION	9.1 14.2 8.6 5.2 6.4 1.9 4.8	9.1 8.1 2.3 7.3 7.4 3.3 11.1 5.9	15.0 12.7 5.4 6.6 5.6 2.2 1.4 5.0 0.7	6.1 4.2 5.7 5.5 4.9 7.0 5.4 10.3 2.6 0.6	10.0 5.3 2.7 9.0 6.1 6.0 5.1 9.3 1.3	14.2 7.4 6.1 7.7 18.9 4.3 3.7 5.2 2.5	9.9 8.4 5.1 6.9 7.6 4.3 5.6 7.4 1.5 0.1
- BACK-ROB ASSEMBLE BALANCING	42.5	44.5	45.4	0.6 47.1 0.6	45.2	30.1	43.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

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TABLE 13
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG <u>1</u> OF <u>4</u>

ANHEACTIDING	TECHNOLOGY	FUNCTIONAL	CATEGORY:	SHEET METAL

NAVAIREWORKFAC	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
MANU. TECH OPERATION PHOTO TEMPLATE PHOTO ENGRAVING MANUFACTURE KIRKSITE DIES: - DROP HAMMER - PUNCH PRESS - STRETCH PRESS - HYDROFORM/ROLL FORM FABRICATE METAL PARTS: - BAND SAW - DROP HAMMER - PUNCH PRESS - ROUTER	1.0 1.1 2.2		JACKSONVILLE 1.1 0.7 2.3 0.8 1.0	0.1 0.2 0.0		0.7 1.3	0.0 0.0 0.0 0.2 0.2 0.8 0.9 0.4
- ROUTER - RADIAL DRAW FORMER - BELT SANDER - STRETCH PRESS	0.1	0.2	1.0	0.2	1.1	0.3	0.4 0.0 0.3 0.0
- SPINNING LATHE - HYDROFORM/ROLL FORM - TURRET PUNCH	0.3 2.9 4.4	0.1	0.5	0.2	1.1	0.3	0.6

TABLE 13 PRODUCTION SHOPS SURVEY (Percent of NAVAIREWORKFAC Total)

PG <u>2</u> OF <u>4</u>

MANUFACT	URING TECHN	NOLOGY FUNCTION	AL CATEGORY	: SHEET M	ETAL	
LAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TO

NAVAIREWORKFAC MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
	1.5	0.7	6.8	3.0	3.1	2.4	3.0
- SHEAR	3.6	0.9	5.3	2.7	2.0	1.7	2.6
- BRAKE	3.0		0.7				0.1
- DRILL			1.5				0.2
MANUFACTURE PLASTER PATTERNS AND FORMS	20	0.3		0.0	0.1		0.1
HEAT TREAT	6.4	0.6			- A		0.1
PACK ALUMINIZE		0.4					0,1
METAL SPRAY: - PREPARING FOR SPRAY		0.9					0.1
METAL SPRAYINGCLEANING/MASKING		0.5					0.1
RIGID METAL TUBING: - MANUFACTURE	0.6	1.5	1.5		0.1		0.5
- REPAIR	2.1	0.4	0.2		0.1		
FLEXIBLE HOSE: - MANUFACTURE		1.4	1.5			0.7	0.4
- REPAIR		0.4					

TABLE 13
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG <u>3</u> OF <u>4</u>

MANUFACTURING	TECHNOLOGY	FUNCTIONAL	CATEGORY:	SHEET	METAL

NAVAIREWORKFAC MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
INCIDENTAL TO WELDING:							
- GRINDING	7.1	2.9	2.6	0.8	2.6	0.7	2.5
- PATCHING	0.6	2.4	1.1	0.6	1.2	1.7	1.3
- RIVETING	7.0	0.8	2.5	0.5	0.8	4.5	2.3
- BLENDING	2.5	1.3	1.3	0.2	1.1	0.6	1.1
- DIE CHECKING	0.4	0.3	0.8	0.2	4.4	0.5	1.4
REPAIR/REPLACE:					120		
- SKIN PANELS	2.6	4.1	10.5	11.6	4.9	8.3	7.1
- RIBS	2.0	4.2	4.1	3.2	4.5	4.4	3.9
- STRINGERS	1.8	2.8	3.0	3.4	4.5	2.9	3.3
- SPARS	4.7	2.0	1.7	1.7	2.4	5.3	2.8
- FITTINGS	1.4	3.2	3.7	6.4	2.2	4.9	3.6
MANUFACTURE/INSTALL:					9		
- STRUCTURAL REPAIR PARTS	6.5	20.1	9.6	20.7	4.5	11.5	11.7
REPAIR/SEAL INTEGRAL FUEL CELLS	9.2	1.5	5.0	3.5	1.0	3.5	3.4
REMOVE/TREAT CORROSION	13.3	2.3	8.0	7.0	9.8	14.6	9.1
SPOT/TACK WELDING ON:							
- STEEL		1.2		0.4	0.1		0.3

TABLE 13
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG <u>4</u> OF <u>4</u>

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY:	SHEET	METAL
---	-------	-------

NAVAIREWORKFAC		- GUEDDY			NORTH		
MANU. TECH OPERATION	ALAMEDA	POINT	JACKSONVILLE	NORFOLK	ISLAND	PENSACOLA	TOTAL
- STAINLESS STEEL	0.2	1.6		0.2			0.3
REPAIR/MODIFY:							
- AILERONS	0.2	1.1	2.1	0.1	0.8	0.4	0.8
- FLAPS	0.2	1.4	2.3	0.9	0.9	0.4	1.1
- SLATS	0.2	0.1	0.1	0.2	0.2	0.2	0.2
- FINS	0.5	0.3	0.6	2.7	0.9	0.8	1.0
- STABILIZERS	1.4	3.2	1.9	2.4	2.4	0.8	2.1
- VENTRAL FINS	0.2	1.5	0.3	0.1	0.6	0.4	0.5
- LEADING EDGES	0.2	1.1	1.9	1.4	0.6	1.0	1.0
- BONDED PANELS	0.5	0.4		0.6	0.5	0.2	0.4
- FLOOR BOARDS	1.1	1.4	0.2	0.1	0.4	0.5	0.6
- ACCESS PANELS	1.8	4.6	4.8	1.6	1.0	0.9	2.3
- OTHER LAMINATED/ HONEYCOMB STRUCTURES	0.7	0.8	0.5	7.2	1.2	0.2	1.8
COMPLY WITH TECHNICAL DIRECTIVES	7.4	22.1	4.2	15.8	37.2	16.1	19.5
REPAIR FIBREGLASS			4 17		0.1	a T	0.0
MISC. SHORING/ADJUSTMENTS				0.2			0.0
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0

TABLE 14
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG <u>1</u> OF <u>2</u>

NAVAIREWORKFAC	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
ANU. TECH OPERATION NON-DESTRUCTIVE TESTING: - DYE PENETRANT - MAGNAFLUX - ZYGLO/FLUORESCENT PENETRANT - ULTRASONIC - RADIOGRAPHIC	ALATEDA		7.1 10.9 3.7 1.3	1.4 2.8 1.2 3.8 0.9	2.9 2.9 7.6 0.2	4.1 5.1 4.1 5.1 2.0	0.4 2.4 4.0 1.4 1.7
- EDDY CURRENT OPERATIONAL TESTING (INCL. TEST CELLS)	32.9	57.4	28.4	53.7	36.6		34.3
AUTOMATIC TEST EQUIPMENT: - DITMCO $\frac{1}{}$ - NARF-5500 $\frac{1}{}$ - OTHER $\frac{1}{}$	0.5	1.6		3.0	20.5		0.7 0.2 9.0
GROUND CHECK: - ENGINES - AIRCRAFT - ELECTRICAL - ELECTRONIC	10.4 5.2 5.2 15.7	2.0 7.0 2.8 1.4	11.8 16.6 11.8 2.4	0.5 2.5 2.5 4.6	4.9 17.3 6.6	7.2 41.1 17.0 14.3	6.4 14.0 7.4 7.5

PG <u>2</u> OF <u>2</u>

TABLE 14 PRODUCTION SHOPS SURVEY (Percent of NAVAIREWORKFAC Total)

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: TESTING

NAVAIREWORKFAC MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
ENGINE TESTS: - BALANCING - DRESSING - UNDRESSING NITAL ETCH COPPER SULFATE TEST ASSEMBLY/MODIFY OIL ANALYSIS	17.2	9.8	2.6	11.3 7.5 0.2 0.0	100.0	100.0	1.1 2.2 1.5 0.0 0.0 4.2 0.4
1/SEE ALSO TABLE 11 - "ELECTRICAL/ELECTRONIC"							

- INDEX

TURNING

FACING

TAPPING

THREADING

- SPECIAL

BORING/JIG BORING

SUPER FINISHING

ELECTRICAL DISCHARGE MACHINE

TABLE 15 PRODUCTION SHOPS SURVEY (Percent of NAVAIREWORKFAC Total) PG _1 OF _3_

4.3

1.5

11.9

8.6

3.0

2.0

1.4

0.7

7.1

1.2

9.4

14.7

3.3

1.9

1.1

0.4

4.2

0.3

9.4

6.8

2.7

1.9

1.0

0.8

	1		NOLOGY FUNCTION				
NAVAIREWORKFAC MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
SHAPING	0.6		0.1	0.5	0.2	0.8	0.4
GRINDING: - INTERNAL	5.2	4.4	10.9	3.7	3.8	5.4	5.1
- EXTERNAL	7.6	9.1	9.7	9.9	10.5	20.3	11.4
- SURFACE	2.4	3.0	3.0	3.1	0.8	2.8	0.5
- ELECTROLYTIC	1.2		1.7	0.6	0.1	0.1	1575252
MILLING:	2.0	1.4	3.0	8.3	4.7	2.4	4.3
- POCKET	3.9	5.0	3.0	0.1	1.5	0.9	1.6
- GANG	3.1	10.7	3.1	4.9	4.6	2.1	4.3
- ANGULAR	2.5	7 7	2.9	1.1	3.3	2.2	3.1

2.9

7.1

2.3

15.1

11.5

1.7

1.1

1.9

0.6

7.7

3.2

21.0

12.9

3.6

2.1

2.9

1.4

3.5

3.5

3.0

12.9

6.0

2.4

3.2

2.2

1.2

1.1

2.8

10.8

4.4

4.2

1.4

0.7

0.1

TABLE 15 PRODUCTION SHOPS SURVEY (Percent of NAVAIREWORKFAC Total)

PG _2 OF _3_

NAVAIREWORKFAC	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
PERATION					1.7		0.5
LAPPING		2.1	7.4	4.6	12.4	12.0	8.6
DRILLING/SLOTTING	5.8	3.1		1.7	2.8	0.3	1.8
HONING	2.6	0.7	0.7	1.7	0.4		0.1
PUNCHING			0.5	0.2	2.0	1.5	1.4
SPOT FACING	2.8	0.4	0.5	0.2	0.5		0.2
ENGRAVING			0.6	0.3	. 3.5	1.9	2.0
COUNTER-SINKING	2.8	0.4	0.6	0.5	0.1	200000	0.3
VALVE GRINDING			2.3		0.1		0.0
DEBURRING					0.1		
MODIFICATION/REPAIR	0.7	1.7	7.3	4.1	3.0	2.2	4.5
OF TOOLING	9.7	1.7	1.5	1.1			0.2
MAINTAIN RESTRIKE DIES							
RESTRIKE (HOT FORMING) OF AIRCRAFT ENGINE NOZZLE GUIDE VANES				0.7			0.1
REPLACE:			2.0	1.3	2.4	3.9	2.4
- BUSHINGS	2.6	1.8	2.0	1.0	5.6	0.5	2.5
- BEARINGS	2.6	0.7	0.6	0.6	5.6	0.3	2.1
- FITTINGS	0.6	1.4	0.9	1	2.0	30.797.54.40.0	0.9
- TRANSFER TUBES	1.2		200	0.4	2.0		-

7

TABLE 15
PRODUCTION SHOPS SURVEY
(Percent of NAVAIREWORKFAC Total)

PG <u>3</u> OF <u>3</u>

	MANUFAC	TURING TECHN	OLOGY FUNCTION	NAL CATEGORY	: MACHIN	ING	
NAVAIREWORKFAC MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
REPLACE: (Cont'd)				10			
- HELICOILS/INSERTS		0.6			0.5		0.2
- GUIDES	1.6			0.4	0.1		0.4
- CONE SEATS	0.4			0.4			0.1
- STUDS	2.4	0.8	0.2	0.3	0.8	1.3	1.0
METALLIZE				12.4			2.1
REMOVE/REWORK/INSTALL CATAPULT/ARRESTING GEAR				12.6			2.1
ELECTRON BEAM WELDING			1.7				0.2
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0
					i		

TOTAL	DISASSEMBLE CLEAN INSPECT REPAIR/REWORK MODIFY REASSEMBLE/BALANCE TEST	MANU. TECH NAVAIREWORKFAC	
100.0	16.9 5.4 6.9 15.0 4.5 29.7 21.5	ALAMEDA	MANUFACT
100.0	14.1 7.9 4.0 10.9 3.3 40.7	CHERRY	T PRODUCTI Percent of N
100.0	10.0 3.8 5.7 24.0 3.0 18.0 35.5	JACKSONVILLE	TABLE 16 PRODUCTION SHOPS SURVEY (Percent of NAVAIREWORKFAC Total)
100.0	21.8 5.2 5.4 12.9 4.1 34.6 16.1	NORFOLK	Total) VAL CATEGORY:
100.0	9.4 3.4 9.6 13.1 9.4 37.8	NORTH ISLAND	Ĩ
100.0	10.0 3.0 10.0 17.0 5.0 30.0 25.0	PENSACOLA	PG 1 O
100.0	14.6 5.1 6.9 14.6 5.1 32.7 21.0	TOTAL	0F 1

	0	PRODUCT:	TABLE 17 PRODUCTION SHOPS SURVEY (Percent of NAVAIREWORKFAC Total)	VEY C Total)		PG	0F2_
	MANUFACT	URING TECHNO	MANUFACTURING TECHNOLOGY FUNCTIONAL	NAL CATEGORY:	1	STRIP/FINISH/PAINT	
NAVAIREWORKFAC MANU. TECH OPERATION	ALAMEDA	CHERRY	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
CLEANING:							
- STRIPPING	19.8	18.5	8.9	2.3	21.2	15.3	15.3
- DEGREASING		1.0	1.8	0.4	1.9	0.7	1.2
- VACUBLASTING/SEED BLASTING		4.9	4.7		3.7		2.7
- CORROSION TREATING		3.9	1.6	1.0	4.2	0.2	2.1
- TANK SOAKING		2.7	0.9	0.4	0.3	1.5	0.9
- WATER SPRAY	2.8	2.5	6.3		2.7	2.4	3.2
- SCRAPING	2.8	1.3	3.1	1.0	1.6	3.1	2.3
- STEAMING	2.8	5.6	9.9	0.4	6.8	3.9	5.8
- MASKING					3.4		0.9
SEALING/CORROSION TREATMENT		1.8	1.7	18.7	2.6	1.9	3.2
PAINTING:							
- CLEANING	10.8	7.5	17.0	3.8	13.0	9.6	11.6
- MASKING/TAPING/ UNMASKING	15.4	18.2	17.0	20.0	11.0	17.9	15.7
- DOPING FABRIC	2.4						0.4
- SANDING					3.1		0.8
- PAINTING	32.2	26.4	17.8	25.0	15.5	25.4	22.2

TABLE 17 PRODUCTION SHOPS SURVEY (Percent of NAVAIREWORKFAC Total)

PG _2 OF _2

MANUEACTURING	TECHNOLOGY	FUNCTIONAL	CATEGORY:	STRIP	FINISH/PAINT

	PIMIOTAGE	MINO IDOI	T				
NAVAIREWORKFAC MANU. TECH OPERATION	ALAMEDA	CHERRY POINT	JACKSONVILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL
REPAIR/RECONDITION OLD FABRIC SURFACES APPLY MARKINGS/DECALS MANUFACTURE DECALS/ID PLATES POWDER COATING/CODEP PROCESS/ BLACK OXIDE	10.8	5.8	5.9	18.1 7.6 1.3	7.2	18.2	9.8 1.4 0.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0
						3	
							1

- Repair and/or replace skin panels.
- Repair and/or replace ribs.

Testing

- Operational testing (including test cell operation).
- Ground check of aircraft.
- 3. "Other" automatic test equipment.
- 4. Ground check of electronic equipment.
- 5. Ground check of electrical equipment.

Machining

- 1. Turning.
- External grinding.
- 3. Boring and jig boring.
- 4. Drilling and slotting.
- Internal grinding.

Hydraulic/Pneumatic

- Reassemble and balance.
- 2. Test.
- 3. Disassemble.
- Repair and rework.
- 5. Inspect.

Strip/Finish/Paint

- Painting.
- Masking, taping and unmasking (for painting).
- Stripping (for cleaning).
- Cleaning (for painting).
- 5. Apply markings and decalcomanias.

The percent of that cost driver within its MT functional category was determined and is given in Figure 16. The top five elemental cost drivers within each MT functional category were then added together. The percent of total NAVAIREWORKFAC direct labor costs for each MT functional category was also identified. From these data, the percent of total NAVAIREWORKFAC direct labor costs represented by the total elemental cost drivers noted above could be determined. By concentrating on the 35 elemental cost drivers so noted, 44.5% of the total NAVAIREWORKFAC direct labor costs were included.

"TOP FIVE" ELEMENTAL COST DRIVERS
(PERCENT OF MT FUNCTIONAL CATEGORY)

		MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY STRIP/							
	ELECTRICAL/ ELECTRONIC	DISASSEMBLE/ ASSEMBLE	SHEET METAL	TESTING	MACHINING	HYDRAULIC/ PNEUMATIC	FINISH/ PAINT	TOTAL FOR PROD. SHOPS SURVEYED	
COST DRIVER NO. 1	13.8	43.1	19.5	34.3	11.9	32.7	22.2	24.3	
COST DRIVER NO. 2	9.2	9.9	11.7	14.0	11.4	21.0	15.7	11.8	
COST DRIVER NO. 3	9.2	8.4	9.1	9.0	8.6	14.6	15.3	9.9	
COST DRIVER NO. 4	9.0	7.6	7.1	7.5	8.6	14.6	11.6	8.8	
COST DRIVER NO. 5	7.3	7.4	3.9	7.4	5.1	6.9	9.8	6.6	
TOTAL (COST DRIVERS NO. 1 – NO. 5)	48.5	76.4	51.3	72.2	45.6	89.8	74.6	61.5	
PERCENT TOTAL NAVAIREWORKFAC DIRECT LABOR COSTS FOR MT FUNCTIONAL CATEGORY	20.0	16.7	13.8	6.9	6.0	4.7	4.0	72.1	
PERCENT TOTAL NAVAIREWORKFAC DIRECT LABOR COSTS FOR "TOP FIVE" COST DRIVERS	9.7	12.8	7.1	5.0	2.7	4.2	3.0	44.5	

SECTION VII

CONCLUSIONS

Based on the data synthesized and analyzed in this MT study, it was concluded that:

- Although a great deal of performance data is available for NAVAIREWORKFAC products, i.e. aircraft, missiles, engines, components (F/E material), other support and manufacturing, there is a paucity of data related to processes performed in the NAVAIREWORKFAC industrial operations.

 Some process information is tabulated in N/C Machine Utilization Reports, the Geographical Area Report (at NAVAIREWORKFAC Jacksonville), and to some extent LAGTAB Segment Reports.
- It was possible to define manufacturing technology (MT) functional categories which were universal and applicable to all NAVAIREWORKFACS.
- Direct labor costs are more susceptible to influence and control by local management authorities than are direct material costs. Direct material costs are more greatly affected by decisions of the material acquisition manager and the engineering (i.e. technical) managers.
- The "top seven" MT functional categories include 72% of direct labor costs and 63% of direct material costs. Of these "top seven" categories, the first five categories listed are common to both direct labor costs and direct material costs (although the rank order listing is rearranged after the first two categories listed).

- The highest direct labor costs exist in the aircraft rework program, followed by the component F/E material rework program.
- The highest direct material costs exist in the component F/E material rework program, followed by the engine rework program.
- For the aircraft rework program, the highest cost MT sub-function involved "install, attach, rework" type of work. The highest cost system involved "structures" for two of the three aircraft studied, and "electrical" for the third aircraft. These conclusions, which were based on MDR analysis, were generally substantiated by the aircraft LAGTAB segments analysis.
- For the engine rework program, the highest cost MT effort involved "CER and Minor Repair" work which is somewhat similar to the "install, attach, rework" type of work noted above. Likewise, this conclusion, which was based on engine LAGTAB segments analysis, was substantiated by the MDR analysis of the T56, J79 and LM1500 engines.
- Among numerical control machines, machining centers performed the highest percentage of work both in terms of production time and cutting time. N/C lathe work was the second highest cost operation.
- The sum of the "top five" elemental direct labor cost drivers from each of the "top seven" MT functional categories accounted for 44.5% of the total direct labor costs.

- Although the product lines varied considerably among the NAVAIREWORKFACs, the percentage distribution of direct labor costs among the largest MT functional categories was relatively stable. These data will provide a reasonable basis for further manufacturing technology considerations and effort. However, to insure that future MT efforts are being focused on the appropriate MT functional categories, a periodic update of the data contained in this study would be desirable. This would be most easily done by those NAVAIREWORKFACs (i.e., Alameda, Norfolk and North Island) which are now on the Manufacturing Analysis Retrieval System (MARS).
- Though focused on identifying cost drivers which are susceptible to improving overall productivity through the application of manufacturing technology, the study results can be applied to other areas of concern to NAVAIREWORKFAC management. Some of these areas of consideration are:
 - Staffing plans
 - New hires
 - Reassignments
 - Training programs
 - Product oriented
 - Apprentice
 - Equipment purchase
 - Support functions
 - Handling & transportation

SECTION VIII

RECOMMENDATIONS

It is recommended that:

- Local NAVAIREWORKFAC management take action to initiate manufacturing technology projects where appropriate with respect to the following functional categories:
 - Electrical/Electronic
 - Disassemble/Assemble
 - Sheet Metal
 - Testing
 - Machining
 - Hydraulic/Pneumatic
 - Strip/Finish/Paint

Inasmuch as these functions are common to all NAVAIREWORKFACS, MT projects should be coordinated to insure maximum cost effectiveness and eliminate possible duplication. It is further recommended that prototype installations of MT projects be made at a single NAVAIREWORKFAC and thus be proven operationally before installing the project at the balance of the NAVAIREWORKFACS. The functional categories listed above represent the direct labor high cost drivers. The sum of the five highest elemental cost drivers in each of the seven functional categories listed constitute 44.5% of total direct labor costs. It is recommended that these elemental cost drivers be referred to in allocating resources to proposed manufacturing technology projects.

Plant arrangement to facilitate movement of work.

- Material acquisition management take action to review and initiate manufacturing technology projects where appropriate related to material used by the NAVAIREWORKFACs in the following functional categories:
 - Electrical/Electronic
 - Disassemble/Assemble
 - Hydraulic/Pneumatic
 - Machining
 - Sheet Metal
 - Helicopter Dynamic Components
 - Compressor/Turbine/Engine Metal Repair
 - MT functional category data be updated periodically to insure that planned and ongoing MT effort is focused on the appropriate MT functional categories. To assist in gaining this objective, the Manufacturing Analysis Retrieval System (MARS) should be expanded to cover those NAVAIREWORKFACs (i.e., Cherry Point, Jacksonville and Pensacola) not now on this system.
 - Results of this study be used as appropriate
 in all phases of NAVAIREWORKFAC operation. Pertinent phases
 are considered to be:
 - Formulation of staffing plans
 - Planning for training programs
 - Providing support functions
 - Identifying construction, plant equipment and material handling needs.

GLOSSARY OF TERMS

- Acquisition manager Individual responsible for the acquisition of weapon systems, individual items of equipment and facilities, and for planning the logistic support of these end items.
- Complete Engine Repair (CER) The repair of engines beyond that depth authorized for intermediate maintenance action but not to the extent of overhaul.
- Cost driver Any process, function or part which contributes significantly to the cost of an operation.
- Functional category Generic identification of those production or process oriented functions which are performed by the naval air rework facilities.
- Master Data Record (MDR) Production engineering process specification for the rework of a product.
- Technical directive Document providing technical information necessary to properly and systematically inspect or alter the configuration of aircraft, engines, systems, or equipments subsequent to establishment of each respective baseline configuration.

LIST OF ABBREVIATIONS AND ACRONYMS

AMP Analytical maintenance program

CER Complete engine repair

CODEP Co-deposition (process)

DLM Depot level maintenance

LAGTAB Local Analysis Grouped and Tabulated

for Apportionment of Budgets

MDR Master data record

MT Manufacturing technology

NAVAIREWORKFAC Naval air rework facility

N/C Numerical control

NDT Non-destructive testing

SDLM Standard depot level maintenance

SLEP Service life extension program

TMS Type-model-series

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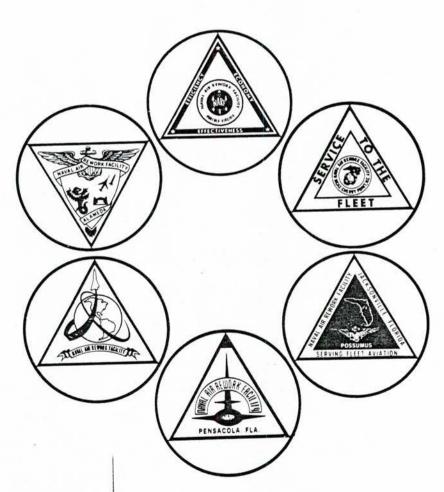
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MANUFACTURING TECHNOLOGY COST DRIVERS STUDY OF AIRCRAFT REWORK, OVERHAUL AND REMANUFACTURE PROCESSES

VOLUME II - ADDENDUM



CONTAINS SENSITIVE INFORMATION WHICH SHOULD BE DISSEMINATED PRUDENTLY.

JANUARY 31, 1979



FOREWORD

This addendum is the second of a two-volume report on the Manufacturing Technology (MT) Cost Drivers Study of Aircraft Rework, Overhaul and Remanufacture Processes. It is a compendium of the actual cost and utilization data collected during the study. Wherever possible, the data covers the base period of July 1, 1977 to Dec. 31, 1977. For practical reasons, it was not possible to collect data covering this specific period in every case. In those instances where a different time period was applicable, the data were factored to a six month period corresponding to the base period. All percentage data displayed in Volume I of this report were calculated by normalizing the data contained in this addendum. By confining the display of actual dollars or hours to the data in Volume II, indiscriminate proliferation of these data could be avoided and the integrity of the data base could be protected properly by controlling the distribution of Volume II.

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SECTION I

INTRODUCTION

Actual costs in dollars or hours which were incurred by the NAVAIREWORKFACS during the periods cited are
contained in this volume. Wherever possible, existing reports were used to obtain the pertinent data for the manufacturing technology (MT) cost drivers study of aircraft
rework, overhaul and remanufacture processes. The source
documents used and the figures containing these data are:

- NAVAIREWORKFAC financial records Figures A-1 through A-30
- N/C Machine Utilization Report Figures A-31 through A-50
- Geographical Area Report Figures A-51 & A-52

The utilization of each numerical control (N/C) machine at each NAVAIREWORKFAC is reported upon monthly. This N/C Machine Utilization Report includes both production and non-production time. Production time is the sum of cutting, proveout, set-up, warm-up and clean-up times. Non-production time is the sum of no work, no operator, no tools, maintenance or other miscellaneous down times. Utilization is defined as the ratio of total production time to total scheduled time.

To determine elemental cost drivers, it was necessary to design and use a special report. This report surveyed the work of the production shops in the seven most costly MT functional categories at all of the NAVAIREWORKFACS. The results of this survey are given in Tables A-1 through A-7.

SECTION II

DISCUSSION

In the course of the manufacturing technology (MT) cost drivers study, functional categories were identified to delineate processes required in the rework, overhaul and remanufacture of naval aircraft and aeronautical material. Though it was possible to identify many generic processes, it was found that some efforts were so product oriented that it was impractical to classify that work generically. Therefore, a list of "miscellaneous" functional categories evolved. Also, in some cases, additional "miscellaneous" functional categories were added by specific NAVAIREWORKFACS as was appropriate for their workload. Though other NAVAIREWORKFACS may work on some of the same "miscellaneous" products, the total production cost was below the threshold at which the high cost drivers of interest would be affected. For that reason, no effort was made to complete the data base for these particular "miscellaneous" items.

In determining percentages given in Volume I, the convention was adopted to use "0.0" when there was a measurable degree of effort reported in the data base but which calculated to be less than 0.05%.

Although there was a consensus among the study team members of how the total industrial operation should be grouped into MT functional categories, some of the data collected represented a combination of two or more MT functional

categories. This has been explained by notes on the appropriate figures in this volume. It is considered that these combinations did not affect the final cost driver study results significantly.

For the elemental operations covered in the production shop survey, no special effort was made to define the terms used. It was considered that the terms were reasonably well-known within the NAVAIREWORKFAC community and further definition was not warranted. For each of the shops surveyed, the number of direct workers, less supervision, was identified. Actual estimates of the time or percentage of time devoted to performing each elemental operation within that shop were made by the first-line supervisor of the shop. By this approach, it was considered that the survey would identify the actual operations being performed currently by the NAVAIREWORKFAC production organization. For each shop, the first-line supervisors' estimates were converted arithmetically to the number of "equivalent people" performing the elemental operation listed. This, then, formed the data base which led to the determination of the elemental cost drivers. The data base reported on a total of 7512 people working within the "top seven" direct labor cost driver functional categories at the six naval air rework facilities.

SECTION III

SUMMARY

Some of the actual costs which comprised the primary cost drivers are given below. All dollar values given are for the six month base period of July 1, 1977 to December 31, 1977 except where noted on the individual figure in this addendum.

- For direct labor only, the "top seven" most costly MT functional categories were:
 - Electrical/Electronic: \$22.1M
 - Disassemble/Assemble: \$18.5M
 - Sheet Metal: \$15.3M
 - Testing: \$7.7M
 - Machining: \$6.7M
 - Hydraulic/Pneumatic: \$5.2M
 - Strip/Finish/Paint: \$4.5M
- For direct material only, the "top seven" most costly MT functional categories were:
 - Electrical/Electronic: \$17.5M
 - Disassemble/Assemble: \$14.4M
 - Hydraulic/Pneumatic: \$12.6M
 - Machining: \$7.2M
 - Sheet Metal: \$6.7M
 - Helicopter Dynamic Components: \$4.9M
 - Compressor/Turbine/Engine Metal Repair: \$4.2M

- For specific rework programs, those with the highest direct labor costs were:
 - Aircraft rework: \$49.7M
 - Component F/E material rework: \$32.8M
- For specific rework programs, those with the highest direct material costs were:
 - Component F/E material rework: \$54.3M
 - Engine rework: \$23.5M
- For all NAVAIREWORKFAC MT functional categories
 the total direct costs were:
 - Direct labor: \$110.7M
 - Direct material: \$107.9M
- Direct labor and direct material: \$218.6M

 Conclusions and recommendations are given in

 Volume I of this report.

FIGURE A-1

AIRCRAFT REWORK DIRECT LABOR (DOLLARS) 1 JUL 77 – 31 DEC 77

MT NAVAIREWORKFAC FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	589,592	218,551	15,642	352,908	546.341	396,999	2,120,033	4.3
DISASSEMBLE/ASSEMBLE	873,716	1,630,160	436,763	3,303,271	4,723,373	1,986,150	12 953 433	26.1
ELECTRICAL/ELECTRONIC	710,274	885,376	488,462	1,632,044	2,663,134	1,359,509	7.738.799	15.6
HYDRAULICS/PNEUMATICS	241,376	58,028	85,751	199,651	104,798	82.976	772.580	1.6
BONDING	200,818	1,557	-	-	14	191,712	394,101	0.8
STRIP/FINISH/PAINT	674,871	297,037	465,529	350,587	739,598	581,799	3,109,421	6.3
WELD	91,587	5,388	12,197	24,161	11,627	24,453	169,413	0.3
MACHINE	39,116	76,422	81,849	177,147	596,403	229,819	1,200,756	2.4
WIRE CUT/MANUFACTURING	=	28,002	12,771	148,088	12,403	E	200,094	0.4
FORGE/FOUNDRY	1	4,192	2,697	0	170	2,609	20,553	0.0
LAYOUT/PATTERN	21,770	9,421	721	5,072	3,970	14,915	44,263	0.1
SHEET METAL	1,382,106	751,683	764,955	2,805,798	3,047,283	2,436,441	11,188,266	22.5
CLEAN, ABRASIVE)	9,372	29,403	137,365	25,761	2,981	315,432	0.6
CLEAN, CHEMICAL	221,100	111,136	ne	217,108	932	478,696	918,422	1.8
HEAT TREAT	8,086	-	2,664	500000000 SE		24,454	35,204	0.1
PLATING	32,589	14,023	19,955	66,603	1-1	71,451	204,621	0.4
PACKING/PRESERVATION	1,385	6,140	15,692	27,384	40,217	125,410	216,228	0.4
CALIBRATION	6	129	97	114	97,489	78	97,913	0.2
TESTING	998,540	13,651	246,410	586,215	2,148,102	790,602	4,783,520	9.6
MISCELLANEOUS-	23	1				1		
ARMAMENT	133,395	41,755	29,704	273,025	94,642	184,942	757,463	1.5
BEARINGS	7,095	1,635	7,996		·	27,331	44,057	0.1
BLADES - PROP	-	-	1,071	13,410	-		14,481	0.0
ROTOR	-	7,980	-		55,663	63,616	127,259	0.3
CONTROL CABLES			954	-	100	25,748	26,702	0.1
EJECTION SEAT	30	-	15,490	64,829	17.1	-	80,319	0.2
FABRIC/RUBBER/PLASTICS	143,474	158,263	43,375	61,407	191,399	121,482	719,400	1.4
FLIGHT CONTROLS & SUBASSM.	-	8	377,644	8	. 5 5	- 1	377,644	0.8
FUEL CONTROLS & ACCESSORIES	27	= = =	4,356	409,318	3,923	- 1	417,597	0.8
GROUND SUPPORT EQUIPMENT	34,622	134	2,337	981	283,866	2,260	324,200	0.7
LANDING GEAR	76,146	16,517	21,098	31,297	-	129,592	274,650	1.0
MECHANICAL MODS. & REPAIR	20.0	-	416	-	-	- 1	416	0.0
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	Ψ/	-	152	-	=	-	152	0.0
CYLINDER & PISTON	27 "	-		-	129	2	72	72
PROTOTYPE	21:		-	_	3,874	-	3,874	0.0
FIELD SERVICE	27	-	1-	4,000	- 2:	974	4,974	0.0
HELO. DYNAMIC COMPONENTS	=	=	34	= 4:	-	18,523	18,523	0.0
TOTAL	6,481,664	4,346,552	3,185,430	10,891,783	15,394,622	9,375,522	49,675,573	100.0
%	13.0	8.7	6.4	21.9	31.0	18.9	100.0	

NAVAIREWORKFAC				
FUNCTIONAL CATEGORY	ALAMEDA	NORFOLK	TOTAL	'7.
EXAMINATION/EVALUATION	0	39,022	39,022	2.4
DISASSEMBLE/ASSEMBLE	207,373	0	207,373	12.7
ELECTRICAL/ELECTRONIC	52	122,854	122,854	7.5
HYDRAULICS/PNEUMATICS	150	0	. 0	0.0
BONDING	194		194	0.0
STRIP/FINISH/PAINT	1,909	26,722	28,631	1.8
WELD	75	109	184	0.0
MACHINE	547	1,775	2,322	0.1
WIRE CUT/MANUFACTURING	237	11,147	11,384	0.7
FORGE/FOUNDRY	151	0	151	0.0
LAYOUT/PATTERN	25	368	393	0.0
SHEET METAL	72	6,846	6,918	0.4
CLEAN, ABRASIVE	1,097	11,059	12,156	0.7
CLEAN, CHEMICAL	0	, ,,,,,,,	0	0.0
HEAT TREAT	278	9,063	9,341	0.6
PLATING	197753334	3,000	19	0.0
PACKING/PRESERVATION	19	111	111	0.0
CALIBRATION	0	133,440	716,112	44.0
TESTING	582,672	133,440		1
MISCELLANEOUS-		470,199	470,199	28.9
ARMAMENT	_	470,193	_	100
BEARINGS	-	1	1	0.0
BLADES - PROP	-			7
ROTOR	-			
CONTROL CABLES	1			4
EJECTION SEAT	-	-		1 -
FABRIC/RUBBER/PLASTICS	- A-2	=		-
FLIGHT CONTROLS & SUBASSM.	-	-		421
FUEL CONTROLS & ACCESSORIES	S -	~	-	1
GROUND SUPPORT EQUIPMENT	-	-		
LANDING GEAR	¥		-	_
MECHANICAL MODS. & REPAIR	18,1		-	İ
COMPRESSOR/TURBINE/ENGINE METAL REPAIR		-		-
CYLINDER & PISTON	-	-	7	
PROTOTYPE	-	_ =	-	
FIELD SERVICE	_	3#2	-	
HELO. DYNAMIC COMPONENTS	-	-	(4) (#)	-
TOTAL	794,649	832,716	1,627,365	100.0
10000 150 544	48.8	51.2	100.0	

MISSILE REWORK
DIRECT LABOR (DOLLARS)
1 JUL 77 – 31 DEC 77

ENGINE REWORK DIRECT LABOR (DOLLARS) 1 JUL 77 – 31 DEC 77

MT NAVAIREWORKFAC FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	185,638	66,687	60,399	267,638	85,138		665,500	6.4
DISASSEMBLE/ASSEMBLE	1,125,308	730,067	485,396	960,709	255,324		3,556,804	34.3
ELECTRICAL/ELECTRONIC	20,934	26,701	48,835	26,894	385,599	1 - 1	508,963	4.9
HYDRAULICS/PNEUMATICS	470,212	174,266	14,478	74,609	_		733,565	7.1
BONDING	1,513	-	_	-	52		1,565	0.0
STRIP/FINISH/PAINT	79	42,829	51,446	9,155	60,084		163,593	1.6
WELD	1,014	36,780	101,119	120,899	76,927		336,739	3.2
MACHINE	419,989	146,834	273,250	456,875	246,757		1,543,705	14.9
WIRE CUT/MANUFACTURING	413,505	10,131	1,661	2,440	69		14,301	0.1
FORGE/FOUNDRY		3,626	3,330	0	_		6,956	0.1
LAYOUT/PATTERN		155	_	67	_		222	1 22
SHEET METAL	13,397	114,021	10,555	1,848	99,841		239.662	2.3
CLEAN, ABRASIVE	13,397	40,632	95,582	133,074	10,466		279,896	2.3
CLEAN, CHEMICAL	284	44,286	-	36,977	77,216		158,621	
HEAT TREAT	, ,,,	20040400	9,957		73,553		83,830	1.5
PLATING	320		128,831	73,154	21,568	NO N	250,934	0.8
PACKING/PRESERVATION	3,824	23,557	35,618	1,270	109	ENGINE REWORK	114,981	2.4
CALIBRATION	32,947	45,037	88	40	109	l ž	128	1.1
TESTING	0	-	125,767	254,172	126,213	20		0.0
	0	204,576	125,767	254,112	120,213	W I	710,728	6.8
MISCELLANEOUS-			_	36,972	1,231	N R	20.244	
ARMAMENT	41	_	9,812	30,372	1,231		38,244	0.4
BEARINGS	47,979	24,606	9,812	219,864	-		82,397	0.8
BLADES - PROP	-	-	1.72	215,004			219,864	2,1
ROTOR	- =	-	-	_	808		808	0.0
CONTROL CABLES	-	-	_		-		2	
EJECTION SEAT	=	-	127	9,029	-		9,029	0.1
FABRIC/RUBBER/PLASTICS	-	3,585	3,423	585	3,065		10,658	0.1
FLIGHT CONTROLS & SUBASSM.		-	28		570.		28	0.0
FUEL CONTROLS & ACCESSORIES	-	-	178,424	190,959	55,664		425,047•	4.1
GROUND SUPPORT EQUIPMENT	92	-	1570	130			222	0.0
LANDING GEAR	-	-	-	4,359	-		4,359	0.0
MECHANICAL MODS. & REPAIR		-	20		-		20	=
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	-	-	166,392	-	-		166,392	1.6
CYLINDER & PISTON	~	-	53,549	-	-		53,549	0.5
PROTOTYPE	822	-		: : :	24		24	0.0
FIELD SERVICE	1-4	-	-	306	-		306	0.0
HELO. DYNAMIC COMPONENTS			-	12	-		.57	-
TOTAL	2,323,571	1,738,376	1,857,940	2,882,025	1,579,708	9	10,381,620	100.0
%	22.4	16.7	17.9	27.8	15.2		100.0	

FIGURE A-4

COMPONENT F/E MATERIAL DIRECT LABOR (DOLLARS) 1 JUL 77 – 31 DEC 77

MT NAVAIREWORKFAC FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	374,008	250,987	35,996	24,073	52,626	24,743	762,433	2.3
DISASSEMBLE/ASSEMBLE	37,266	419,030	8,036	135,332	145,332	168,806	913,802	2.8
ELECTRICAL/ELECTRONIC	2,726,936	894,593	1,709,887	2,171,802	1,500,405	2,929,895	11,933,518	36.4
HYDRAULICS/PNEUMATICS	1,513,458	466,791	224,488	281,278	357,499	699,479	3,542,993	10.8
BONDING	128,663	157,879	725	_	173,946	2,389	462,877	1.4
STRIP/FINISH/PAINT	70,083	131,022	137,194	59,888	143,386	152,243	693,816	2.1
WELD	34,077	40,378	44,720	76,234	40,878	42,840	279,127	0.9
MACHINE	219,113	253,976	225,000	221,960	501,899	560,062	1,982,010	6.1
WIRE CUT/MANUFACTURING	44	14,345	24,473	197,064	3,488		244,370	0.7
FORGE/FOUNDRY	i i	8,592	2,818	0	128	6,330	19,648	0.1
LAYOUT/PATTERN	3,560	7,210		887	403	2,214	12,494	0.0
	307,696	1	271,562	170,253	202,824	90,912	1,432,583	4.4
SHEET METAL)	389,336 105,111	90,158	66,040	55,575	162,334	546,087	1.7
CLEAN, ABRASIVE	133,738	2.00000000	30,130	42,375	22,847	5,209	255,632	0.8
CLEAN, CHEMICAL	14,909	118,332	5,254	-	177,120	42,841	240,124	0.7
HEAT TREAT	63,903	05.572	100,297	130,832	142,772	130,086	663,463	2.0
PLATING	186,626	95,573	170,796	90,697	54,054	117,544	752,420	2.3
PACKING/PRESERVATION		132,703	162,161	155,908	579,590	163,377	1,382,978	4.2
CALIBRATION	297,216 122,443	24,726	250	294,037	114,247	79 584	760,490	2.3
TESTING	122,443	149,929	250	254,007	113,237	100,000		.52557
MISCELLANEOUS-	275 105		103 131	142,264	62,003	78,895	891,356	2.7
ARMAMENT	375,185	39,878	193,131	142,204	02,003	182,353	421,016	1.3
BEARINGS	162,113	46,474	30,076	190,313	2	-	234,188	0.7
BLADES – PROP	-	-	43,875	190,313	272 905	39,881	820,937	2.5
ROTOR	· ·	407,161	7	1 20	373,895	13,296	16,534	0.1
CONTROL CABLES		-	3,238	-	-	15,250	103,720	0.3
EJECTION SEAT	100	-	2,534	101,186	_	25,572	186,581	0.6
FABRIC/RUBBER/PLASTICS	38,213	52,989	31,754	38,053	0	25,572	5,385	0.0
FLIGHT CONTROLS & SUBASSM.		-	5,385		24.027		458,196	1.4
FUEL CONTROLS & ACCESSORIES		-	163,874	262,395	31,927	55,147	1,470,575	4.5
GROUND SUPPORT EQUIPMENT	532,227	59,548	210,321	277,176	336,156	100 ages	308,941	0.9
LANDING GEAR	71,571	77,198	26,832	48,848	_	84,492	72	0.5
MECHANICAL MODS, & REPAIR	.5	=	-	-	-	-	41,887	0.1
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	-	5. 1	41,837	1	-		29,329	0.000.00
CYLINDER & PISTON	# 200		29,329	-	S =	- 7	1,425	0.1
PROTOTYPE	-	- E	_	gra continue	1,425	-	158,650	0.0
FIELD SERVICE	-		-	158,496	5#	154	729,689	0.5
HELO. DYNAMIC COMPONENTS	-	(2)		-	110	729,689	A College	2.2
TOTAL	7,413,004	4,343,761	3,995,326	5,337,391	5,079,425	6,590,367	32,759,274	100.0
%	22.6	13.3	12.2	16.3	15.5	20.1	100.0	

MT NAVAIREWORKFAC FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	158,583	24,476	5,207	62,384	97,679	31,183	379,512	3.3
DISASSEMBLE/ASSEMBLE	70,139	198,362	44,545	160,521	298,012	69,801	841,380	7.2
ELECTRICAL/ELECTRONIC	66,556	128,406	127,688	525,142	308,926	516,231	1,672,949	14.4
HYDRAULICS/PNEUMATICS	54,866	26,649	20,574	46,313	_	26,082	174,484	1.5
BONDING	20,049	531		_	224	57	20,861	0.2
STRIP/FINISH/PAINT	23,608	15.255	79,344	53,630	65,711	60,966	298,514	2.6
WELD	22,871	2.530	12,041	38,222	14,339	10,008	100,011	0.9
MACHINE	63,697	36,496	28,776	205,436	89,469	161,941	585,815	5.0
WIRE CUT/MANUFACTURING	_	19,676	1,966	47,650	17,272	=	86,564	0.7
FORGE/FOUNDRY	ì	2,053	1,330	0	3,179	37,929	46,162	0.4
LAYOUT/PATTERN	3,341	709		26,598	3,487	115,293	147,757	1.3
SHEET METAL	409,759	117,121	196,571	577,662	178,827	375,042	1,854,982	15.9
CLEAN, ABRASIVE	1	5,249	14,473	23,853	6,345	505	57,052	0.5
CLEAN, CHEMICAL	13,254	8,349	-	25,554	1,885	17,404	59,819	0.5
HEAT TREAT	1,348	2 2	613	22	7,459	10,007	19,427	0.2
PLATING	7,381	2,237	4,115	24,237	5,581	19,732	63,283	0.5
PACKING/PRESERVATION	299,427	11,578	79,088	196,102	198,155	190,937	975,287	8.4
CALIBRATION	560,309	142,484	259,241	292,230	510,929	168,146	1,933,339	16.6
TESTING	122,200	14,327	43,458	152,122	289,998	48,379	670,484	5.8
MISCELLANEOUS-	8	1000			100			
ARMAMENT	12,279	38,128	61,516	58,806	3,451	22,831	197,011	1.7
BEARINGS	35,036	1,539	5,545	-	_	4,378	46,498	0.4
BLADES - PROP	-	-	445	48,820	_	_	49,265	0.4
ROTOR	-	5,137	-	-	4,286	3,232	12,655	0.
CONTROL CABLES		_	264	_	-	5,884	6,148	0.1
EJECTION SEAT	_	-	1,440	29,243	-	-	30,683	0.3
FABRIC/RUBBER/PLASTICS	20,128	12,734	11,150	7,135	0	22,251	73,398	0.0
FLIGHT CONTROLS & SUBASSM.	-	-	10,091	_	_	-	10,091	0.
FUEL CONTROLS & ACCESSORIES	-	_	13,700	83,906	5,068	94	102,674	0.5
GROUND SUPPORT EQUIPMENT	54,060	3,991	74,468	844	398,369	7,571	539,303	4.
LANDING GEAR	4,259	5,106	1,708	14,117	-	3,842	29,032	0.
MECHANICAL MODS. & REPAIR	-	_	76,064	-	-	_	76,064	0.
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	31		3,254	-	-	- "	3,254	0.
CYLINDER & PISTON	_	_	1,522	_	-	3-1	1,522	0.
PROTOTYPE		-	-	_	14,946	-	14,946	0.
FIELD SERVICE		-	-	179,798	-	257,016	436,814	3.
HELO, DYNAMIC COMPONENTS	-	2.	-	32	-	29,191	29,191	0.
TOTAL	2,023,150	823,123	1,180,197	2,880,325	2,523,597	2,215,839	11,646,231	100.
%	17.3	7,1	10.1	24.7	21.7	19.0	100.0	

OTHER SUPPORT DIRECT LABOR (DOLLARS) 1 JUL 77 – 31 DEC 77

MANUFACTURING DIRECT LABOR (DOLLARS) 1 JUL 77 – 31 DEC 77

MT NAVAIREWORKFAC FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	
EXAMINATION/EVALUATION	22,960	234	943		880		25.017	0.5
DISASSEMBLE/ASSEMBLE	99	55		108	16,288	10 339	26.889	06
ELECTRICAL/ELECTRONIC	105,858	735	9,259	15,973	18,111	11.411	161,347	35
HYDRAULICS/PNEUMATICS	1.058	9	5.084	1,518	16,111	man.	7.660	202024
BONDING	13,079	81	3,004	1,310		1 1	13,160	02
STRIP/FINISH/PAINT	9.827	2,142	4,906	73,544	57,468	11,356	159.243	
WELD	14,432	22,349	3,846	46,435	27 698	6,908	121,668	34
MACHINE	412,289	97,211	45,515	333,908	27,698	225.197	1,384,275	, 9
WIRE CUT/MANUFACTURING	412,209	8,145	7,546	1,450	was discussed	225.197	829,927	29 8
FORGE/FOUNDRY	î	22,311	3.166	0	812,786	16 118	140,487	179
LAYOUT/PATTERN	126,646	2.012	3,100	146.010	35,569	27.247	302,902	3.0
SHEET METAL	157,305	66,780	25,080	149,537	64.310	107.674	606,634	6.5
CLEAN, ABRASIVE	157,305	2,355	2,876	363	100,258	107,874		13 1
CLEAN, CHEMICAL	4,274	3,922	2,876		9,229		16,960	0.4
ACTIVITIES OF PRODUCTION AND ACTIVITIES AND ACTIVIT	1	3,922	2.375	586	20000000	20	6,665	0.1
HEAT TREAT	22,043		F 22500000		48,272	6,907	79,597	1.7
PLATING	8 341	4,837	1,989	25,984	5,352	22,703	69,206	15
PACKING/PRESERVATION	5,382	362	2,527	14,846	5.080	1,428	29,625	0.6
CALIBRATION				0	443		443	0.0
TESTING	4,350			7.804	11,281	5,301	28.736	0.6
MISCELLANEOUS-					Ĩ			
ARMAMENT	5,690			2,306		1,696	9,692	0.2
BEARINGS	213		127	-	226,670	72	227,082	4 9
BLADES - PROP			-	-				
ROTOR			-		316	4,183	4.499	0.1
CONTROL CABLES			340		19	11,847	12 187	0.3
EJECTION SEAT	in the	-		2,075	1	2 1	2.075	0.0
FABRIC/RUBBER/PLASTICS	17,343	9,886	22,171	12,834	0	28,956	91.190	2 0
FLIGHT CONTROLS & SUBASSM.			2					
FUEL CONTROLS & ACCESSORIES			-	3,445	0		3,445	0.1
GROUND SUPPORT EQUIPMENT	12,238		#		188,519		200,757	4 3
LANDING GEAR	2,558	1,626	1 -	1,002		454	5,640	0 1
MECHANICAL MODS. & REPAIR		340	-		-			
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	- 4	-	-	HI I	-			
CYLINDER & PISTON		100	F	-	=			
PROTOTYPE		-	4	2	44,311		44,311	10
FIELD SERVICE		1 40		33,056		l al al	33,056	0.7
HELO, DYNAMIC COMPONENTS	-	-1	2	2		2	F	
TOTAL	945,985	245,052	137,750	872,784	1,942,996	499,817	4,644.384	100 0
7.	20.4	5.3	3.0	18.8	41.8	10.8	100 0	1000

TOTAL DIRECT LABOR (DOLLARS) 1 JUL 77 – 31 DEC 77

MT NAVAIREWORKFAC FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%	COST DRIVER RANKING
EXAMINATION/EVALUATION	1,330,781	560,935	118,187	746,025	782,664	452,925	3,991,517	3.6	8
DISASSEMBLE/ASSEMBLE	2,313,901	2,977,674	974,740	4,559,941	5,438,329	2,235,096	18,499,681	16.7	2
ELECTRICAL/ELECTRONIC	3,630,558	1,935,811	2,384,131	4,494,709	4,876,175	4,817,046	22,138,430	20.0	19
HYDRAULICS/PNEUMATICS	2,280,970	725,743	350,375	603,369	462,297	808,537	5,231,291	4.7	6
BONDING	364,316	160,048		-	174,236	194,158	892,758	0.8	21
STRIP/FINISH/PAINT	780,377	488,285	738,419	573,526	1,066,247	806,364	4,453,218	4.0	7
WELD	164,056	107,425	173,923	306,060	171,469	84,209	1,007,142	0.9	19
MACHINE	1,154,751	610,939	654,390	1,397,101	1,704,683	1,177,019	6,698,883	6.0	5
WIRE CUT/MANUFACTURING	237	80,299	48,417	407,839	850,658		1,387,450	1.3	15
FORGE/FOUNDRY	77,734	40,774	13,341	0	39,046	62,986	233,881	0.2	30
LAYOUT/PATTERN	77,734	19,507	-	178,634	72,170	159,669	507,714	0.5	27
SHEET METAL	2,270,288	1,438,941	1,268,723	3,705,466	3,629,033	3,010,069	15,322,520	13.8	3
CLEAN, ABRASIVE	186,396	162,719	232,492	367,541	107,376	165,820	1,222,345	1.1	17
CLEAN, CHEMICAL	187,422	286,025	_	333,659	102,880	501,329	1,411,315	1.3	13
HEAT TREAT	46,706	=	20,863	€	306,404	84,209	458,182	0.4	28
PLATING	116,316	140,227	255,187	329,873	175,273	243,972	1,260,848	1.1	16
PACKING/PRESERVATION	525,786	195,820	303,721	330,299	297,615	435,319	2,088,560	1.9	12
CALIBRATION	857,531	167,339	421,587	448,403	1,188,451	331,601	3,414,912	3.1	9
TESTING	1,830,205	382,483	415,885	1,427,790	2,689,841	923,866	7,670,070	6.9	4
MISCELLANEOUS-									
ARMAMENT	526,590	119,761	284,351	983,572	161,327	288,364	2,363,965	2.1	11
BEARINGS	252,436	74,254	53,556	A	226,670	214,134	821,050	0.7	22
BLADES - PROP	20	-	45,391	472,408	-	-	517,799	0.5	26
ROTOR	2 1	420,278		=	434,968	110,912	966,158	0.9	20
CONTROL CABLES	-	-	4,796		-	56,775	61,571	0.1	36
EJECTION SEAT	-	-	19,464	206,362		-	225,826	0.2	31
FABRIC/RUBBER/PLASTICS	219,158	237,457	111,873	120,014	194,464	198,261	1,081,227	1.0	18
FLIGHT CONTROLS & SUBASSM.	-	-	393,148	#	-	25 7	393,148	0.4	29
FUEL CONTROLS & ACCESSORIES	-	=	360,354	950,023	96,582	-	1,406,959	1.3	14
GROUND SUPPORT EQUIPMENT	633,239	63,673	287,126	279,131	1,206,910	64,978	2,535,057	2,3	10
LANDING GEAR	154,534	100,447	49,638	99,623		218,380	622,622	0.6	25
MECHANICAL MODS. & REPAIR	-	-	76,480	-			76,480	0.1	34
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	=	ist.	211,685	-	-	1	211,685	0.2	32
CYLINDER & PISTON	-	=	84,400	=	22	-	84,400	0.1	33
PROTOTYPE	=	=	72	□ □	64,580	-	64,580	0.1	35
FIELD SERVICE	27	. =	_	375,656	- "	258,144	633,800	0.6	24
HELO, DYNAMIC COMPONENTS			-	Ψ	180	777,403	777,403	0.7	23
TOTAL	19,982,023	11,496,864	10,356,643	23,697,024	26,520,348	18,681,545	110,734,447	100.0	
%.	18.0	10.4	9.4	21.4	23.9	16.9	100.0		

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FIGURE A-8

NAVAIREWORKFAC ALAMEDA DIRECT LABOR (DOLLARS) 1 APR 77 – 30 SEP 77

MT PROGRAM FUNCTIONAL	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	′%
CATEGORY EXAMINATION/EVALUATION	589,592	0	185,638	374,008	158,583	22,960	1,330,781	6.7
Design of the State of the Stat	873,716	207,373	1,125,308	37,266	70,139	99	2,313,901	11.6
DISASSEMBLE/ASSEMBLE	710,274	207,373	20,934	2,726,936	66,556	105,858	3,630,558	18.2
ELECTRICAL/ELECTRONIC	241,376		470,212	1,513,458	54,866	1,058	2,280,970	11.4
HYDRAULICS/PNEUMATICS		194	1,513	128,663	20,049	13,079	364,316	1.8
BONDING	200,818	10,000 %	79	70,083	23,608	9,827	780,377	3.9
STRIP/FINISH/PAINT	674,871	1,909	1,014	34,077	22,871	14,432	164,056	0.8
WELD	91,587	75	419,989	219,113	63,697	412,289	1,154,751	5.8
MACHINE	39,116	547	419,965	215,115		45.015000	237	0.0
WIRE CUT/MANUFACTURING 1	,	237		1	1	1		
FORGE/FOUNDRY	21,770	151	_	3560	3,341	126,646	155,468	0.8
LAYOUT/PATTERN)	40.007	207 505	409,759	157,305	2,270,288	11.4
SHEET METAL	1,382,106	25	13,397	307,696	1)		5333
CLEAN, ABRASIVE	221,100	72	284	133,738	13,254	4,274	373,819	1.9
CLEAN, CHEMICAL)	1,097	11	1)	1,348	22,043	46,706	0.2
HEAT TREAT	8,086	0	320	14,909			116,316	0.6
PLATING	32,589	278	3,824	63,903	7,381	8,341	525,786	2.6
PACKING/PRESERVATION	1,385	19	32,947	186,626	299,427	5,382	857,531	4.3
CALIBRATION	6	0	0	297,216	560,309		The second secon	
TESTING	998,540	582,672	0	122,443	122,200	4,350	1,830,205	9.2
MISCELLANEOUS-			9	200000000000000000000000000000000000000			500 500	
ARMAMENT	133,395	-	41	375,185	12,279	5,690	526,590	2.6
BEARINGS	7,095	-	47,979	162,113	35,036	213	252,436	1.3
BLADES - PROP	-	-	~	=	-	-	_	-
ROTOR	-		=	2		-	_	-
CONTROL CABLES		-	-	-		-	7	
EJECTION SEAT	=	12	-	= :	100	7	_	
FABRIC/RUBBER/PLASTICS	143,474	-	=:	38,213	20,128	17,343	219,158	1.1
FLIGHT CONTROLS & SUBASSM.	-		3.0	-	-	_	-	-
FUEL CONTROLS & ACCESSORIES		-	-		-	-	- E	S-7.
GROUND SUPPORT EQUIPMENT	34,622	-	92	532,227	54,060	12,238	638,239	3.2
	76,146	1	-	71,571	4,259	2,558	154,534	0.8
LANDING GEAR	-3	-	-	-	-	14	**:	-
MECHANICAL MODS. & REPAIR		_	-		-	-	1.00	-
COMPRESSOR/TURBINE/ENGINE METAL REPAIR		1						0.88
CYLINDER & PISTON	-	-	-		01	7		
PROTOTYPE	=	-		-	-	_		
FIELD SERVICE	-	~ :	(77)	-	_	-:	-	-
HELO, DYNAMIC COMPONENTS) + · · ·	-	-	-	274/8600 AV744	()	-	-
2000 Particular de la constantina de la companya del la companya de la companya d	6,481,664	794,649	2,323,571	7,413,004	2,023,150	945,985	19,982,023	100.0
TOTAL	32.4	4.0	11.6	37.1	10.1	4.7	100.0	

MT PROGRAM FUNCTIONAL CATEGORY	AIRCRAFT REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	%
EXAMINATION/EVALUATION	218,551	66,687	250,987	24,476	234	560,935	4.9
DISASSEMBLE/ASSEMBLE	1,630,160	730,067	419,030	198,362	55	2,977,674	25.9
ELECTRICAL/ELECTRONIC	885,376	26,701	894,593	128,406	735	1,935,811	16.8
HYDRAULICS/PNEUMATICS	58,028	174,266	466,791	26,649	9	725,743	6.3
BONDING	1,557	-	157,879	531	81	160,048	1.4
STRIP/FINISH/PAINT	297,037	42,829	131,022	15,255	2,142	488,285	4.2
WELD	5,388	36,780	40,378	2,530	22,349	107,425	0.9
MACHINE	76,422	146,834	253,976	36,496	97,211	610,939	5.3
WIRE CUT/MANUFACTURING	28,002	10,131	14,345	19,676	8,145	80,299	0.7
FORGE/FOUNDRY	4,192	3,626	8,592	2,053	22,311	40,774	0.4
LAYOUT/PATTERN	9,421	155	7,210	709	2,012	19,507	0.2
SHEET METAL	751,683	114,021	389,336	117,121	66,780	1,438,941	12.5
CLEAN, ABRASIVE	9,372	40,632	105,111	5,249	2,355	162,719	1.4
CLEAN, CHEMICAL	111,136	44,286	118,332	8,349	3,922	286,025	2.5
HEAT TREAT 1							
PLATING	14,023	23,557	95,573	2,237	4,837	140,227	1.2
PACKING/PRESERVATION	6,140	45,037	132,703	11,578	362	195,820	1.7
CALIBRATION	129	-	24,726	142,484	9-3	167,339	1.5
TESTING	13,651	204,576	149,929	14,327		382,483	3.3
MISCELLANEOUS-							
ARMAMENT	41,755	Sec. 1	39,878	38,128	-	119,761	1.0
BEARINGS	1,635	24,606	46,474	1,539	12	74,254	0.6
BLADES - PROP	176	-	2		721	+0	-
ROTOR	7,980	9	407,161	5,137	P (6	420,278	3.7
CONTROL CABLES	98	-	=	-		-	-
EJECTION SEAT	::	77.5	-	-	-	⊆ ⊆	-
FABRIC/RUBBER/PLASTICS	158,263	3,585	52,989	12,734	9,886	237,457	2.1
FLIGHT CONTROLS & SUBASSM.	-	-	-	-	-		15
FUEL CONTROLS & ACCESSORIES	-	180	-	=		===	7.5
GROUND SUPPORT EQUIPMENT	134	11340	59,548	3,991	-	63,673	0.6
LANDING GEAR	16,517	-	77,198	5,106	1,626	100,447	0.9
MECHANICAL MODS. & REPAIR	170	-	-	27	-	-	
COMPRESSOR/TURBINE/ENGINE METAL REPAIR			-	=		-	-
CYLINDER & PISTON	-*	144		-	===	200	175
PROTOTYPE	-	-	-	+	20	~	-
FIELD SERVICE	H .		=	=		-	340
HELO. DYNAMIC COMPONENTS	4	-	-	-	-		-
TOTAL	4,346,552	1,738,376	4,343,761	823,123	245,052	11,496,864	100.0
%	37.8	15.1	37.8	7.2	2.1	100.0	

NAVAIREWORKFAC CHERRY POINT DIRECT LABOR (DOLLARS) 1 JUL 77 – 31 DEC 77

NOTES:

¹ INCLUDED IN SHEET METALWELD/FORGE/FOUNDRY

MT PROGRAM FUNCTIONAL CATEGORY	AIRCRAFT REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%
EXAMINATION/EVALUATION	15,642	60,399	35,996	5,207	943	118,187	1.1
DISASSEMBLE/ASSEMBLE	436,763	485,396	8,036	44,545	:40	974,740	9.4
ELECTRICAL/ELECTRONIC	488,462	48,835	1,709,887	127,688	9,259	2,384,131	23.0
HYDRAULICS/PNEUMATICS 1	85,751	14,478	224,488	20,574	5,084	350,375	3.4
BONDING ²							
STRIP/FINISH/PAINT	465,529	51,446	137,194	79,344	4,906	738,419	7.1
WELD	12,197	101,119	44,720	12,041	3,846	173,923	1.7
MACHINE	81,849	273,250	225,000	28,776	45,515	654,390	6.3
WIRE CUT/MANUFACTURING	12,771	1,661	24,473	1,966	7,546	48,417	0.5
FORGE/FOUNDRY	2,697	3,330	2,818	1,330	3,166	13,341	0.1
LAYOUT/PATTERN ³		-SAN-H		80			
MATERIAL PROPERTY CONTRACTOR CONT	764,955	10,555	271,562	196,571	25,080	1,268,723	12.3
SHEET METAL	29,403	95,582	90,158	14,473	2,876	232,492	2.2
CLEAN, ABRASIVE	(00000000000000000000000000000000000000			60000000			
CLEAN, CHEMICAL4	2,664	9,957	5,254	613	2,375	20,863	0.2
HEAT TREAT	19,955	128,831	100,297	4,115	1,989	255,187	2.5
PLATING	15,692	35,618	170,796	79,088	2,527	303,721	2.9
PACKING/PRESERVATION	97	35,618	162,161	259,241	2000	421,587	4.1
CALIBRATION	W4989000000	9792234003	250	43,458	-	415,885	4.0
TESTING	246,410	125,767	250	43,456			
MISCELLANEOUS-	20.704		193,131	61.516		284,351	2.7
ARMAMENT	29,704		70.50	61,516	127	53,556	0.5
BEARINGS	7,996	9,812	30,076	5,545	132	45,391	0.4
BLADES - PROP	1,071		43,875	445		-	
ROTOR	-	-			340	4,796	0.0
CONTROL CABLES	954	3	3,238	264	340	19,464	0.2
EJECTION SEAT	15,490	77.0	2,534	1,440	22.171	111,873	1.1
FABRIC/RUBBER/PLASTICS	43,375	3,423	31,754	11,150	22,171	393,148	3.8
FLIGHT CONTROLS & SUBASSM.	377,644	28	5,385	10,091	**	360,354	3.5
FUEL CONTROLS & ACCESSORIES	4,356	178,424	163,874	13,700		287,126	2.8
GROUND SUPPORT EQUIPMENT	2,337		210,321	74,468		49,638	0.5
LANDING GEAR	21,098	30	26,832	1,708		1	0.7
MECHANICAL MODS. & REPAIR	416	-	7-5	76,064	-	76,480	20
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	152	166,392	41,887	3,254	3	211,685	0.8
CYLINDER & PISTON		53,549	29,329	1,522		84,400	0.8
Francisco de la companya del companya de la companya del companya de la companya	-	- 4	-	24	500	_	_
PROTOTYPE	-	-	-	-	-	-	**
FIELD SERVICE	1-	-	-	-	-	-	
HELO. DYNAMIC COMPONENTS	3,185,430	1,857,940	3,995,326	1,180,197	137,750	10,356,643	100.0
TOTAL	30.8	17.9	38.6	11.4	1.3	100.0	

NAVAIREWORKFAC JACKSONVILLE DIRECT LABOR (DOLLARS) 1 JUL 77 – 31 DEC 77

NOTES:

- 1 NO PNEUMATICS
- 2 INCLUDED IN PLASTICS
- 3 INCLUDED IN SHEET METAL
- 4 INCLUDED ELSEWHERE

MT PROGRAM FUNCTIONAL CATEGORY	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%
EXAMINATION/EVALUATION	352,908	39,022	267,638	24,073	62,384	-	746,025	3.1
DISASSEMBLE/ASSEMBLE	3,303,271	0	960,709	135,332	160,521	108	4,559,941	19.2
ELECTRICAL/ELECTRONIC	1,632,044	122,854	26,894	2,171,802	525,142	15,973	4,494,709	19.0
HYDRAULICS/PNEUMATICS	199,651	0	74,609	281,278	46,313	1,518	603,369	2.5
BONDING 1				1				
STRIP/FINISH/PAINT	350,587	26,722	9,155	59,888	53,630	73,544	573,526	2.4
WELD	24,161	109	120,899	76,234	38,222	46,435	360,060	1.3
MACHINE	177,147	1,775	456,875	221,960	205,436	333,908	1,397,101	5.9
WIRE CUT/MANUFACTURING	148,088	11,147	2,440	197,064	47,650	1,450	407,839	1.7
FORGE/FOUNDRY 2	0	0	0	0	0	0	0	0.0
LAYOUT/PATTERN	5,072	-	67	887	26,598	146,010	178,634	0.8
SHEET METAL	2,805,798	368	1,848	170,253	577,662	149,537	3,705,466	15.6
CLEAN, ABRASIVE	137,365	6,846	133,074	66,040	23,853	363	367,541	1.6
CLEAN, CHEMICAL	217,108	11,059	36,977	42,375	25,554	586	333,659	1.4
HEAT TREAT 2	1.00.00.000.0000		TOPENS INC.					
PLATING	56,603	9,063	73,154	130,832	24,237	25,984	329,873	1.4
PACKING/PRESERVATION	27,384		1,270	90,697	196,102	14,846	330,299	1.4
CALIBRATION	114	111	40	155,908	292,230	0	448,403	1.9
TESTING	586,215	133,440	254,172	294,037	152,122	7,804	1,427,790	6.0
MISCELLANEOUS-				1				
ARMAMENT	273,025	470,199	36,972	142,264	58,806	2,306	983,572	4.2
BEARINGS		2000	1-0		-	=	-	2
BLADES - PROP	13,410	1	219,864	190,313	48,820	=	472,408	2.0
ROTOR	+	-	100	-	-	_	==	-
CONTROL CABLES	-	+:	-	8	-	-	-	
EJECTION SEAT	64,829		9,029	101,186	29,243	2,075	206,362	0.9
FABRIC/RUBBER/PLASTICS	61,407	-	585	38,053	7,135	12,834	120,014	0.5
FLIGHT CONTROLS & SUBASSM.				-	-	-		
FUEL CONTROLS & ACCESSORIES	409,318	-	190,959	262,395	83,906	3,445	950,023	4.0
GROUND SUPPORT EQUIPMENT	981	9	130	277,176	844	=	279,131	1.2
LANDING GEAR	31,297	725	4,359	48,848	14,117	1,002	99,623	0.4
MECHANICAL MODS. & REPAIR	-	(<u>-</u>	-		(E)		=	-
COMPRESSOR/TURBINE/ENGINE METAL REPAIR		-	12	-				=
CYLINDER & PISTON	525	-	-	===	1.5		_	100
PROTOTYPE		-	-	174	15			250
FIELD SERVICE	4,000	-	306	158,496	179,798	33,056	375,656	1.6
HELO, DYNAMIC COMPONENTS	=	=	=	-	-			
TOTAL	10,891,783	832,716	2,882,025	5,337,391	2,880,325	872,784	23,697,024	100.0
%	46.0	3.5	. 12.2	22.5	12.2	3.7	100.0	

NAVAIREWORKFAC NORFOLK DIRECT LABOR (DOLLARS) 1 JUL 77 – 31 DEC 77

NOTES: ¹INCLUDED IN PLASTICS
²INCLUDED IN MACHINE

NAVAIREWORKFAC NORTH ISLAND DIRECT LABOR (DOLLARS) 1 JUL 77 – 31 DEC 77 (FACTORED FROM 1 JUL 77 – 1 JUL 78 DATA)

PROGRAM PROGRAM	AIRCRAFT REWORK	ENGINE REWORK	F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	1%
CATEGORY EXAMINATION/EVALUATION	546,341	85,138	52,626	97,679	880	782,664	3.0
	4,723,373	255,324	145,332	298,012	16,288	5,438,329	20.5
DISASSEMBLE/ASSEMBLE	2,663,134	385,599	1,500,405	308,926	18,111	4,876,175	18.4
LECTRICAL/ELECTRONIC	104,798		357,499	1758	:+-:	462,297	1.7
HYDRAULICS/PNEUMATICS	104,730	52	173,946	224	S-	174,236	0.7
BONDING	739,598	60,084	143,386	65,711	57,468	1,066,247	4.0
STRIP/FINISH/PAINT	100041000	76,927	40,878	14,339	27,698	171,469	0.6
WELD	11,627	246,757	501,899	89,469	270,155	1,704,683	6.4
MACHINE	596,403	69	8,438	17,272	812,786	850,658	3.2
WIRE CUT/MANUFACTURING	12,043	.09	128	3,179	35,569	39,046	0.1
FORGE/FOUNDRY	170	-	403	3,487	64,310	72,170	0.3
LAYOUT/PATTERN	3,970	-	202,824	178,827	100,258	3,629,033	13.7
SHEET METAL	3,047,283	99,841	55,575	6,345	9,229	107,376	0.4
CLEAN, ABRASIVE	25,761	10,466	200000	1,885		102,880	0.4
CLEAN, CHEMICAL	932	77,216	22,847	7,459	48,272	306,404	1.2
HEAT TREAT	-	∀3,553	177,120	5,581	5,352	175,273	0.7
PLATING	2	21,568	142,772	198,155	5,080	297,615	1.1
PACKING/PRESERVATION	40,217	109	54,054	510,929	443	1,188,451	4.5
CALIBRATION	97,489		579,590	7 //www.xxese	2527-0792-07	2,689,841	10.1
TESTING	2,148,102	126,213	114,247	289,998	11,281	/5175315	
MISCELLANEOUS-			2007.2000			161,327	0.6
ARMAMENT	94,642	1,231	62,003	3,451		226,670	0.9
BEARINGS	-			_	226,670	220,070	12
BLADES - PROP	1,00		-	-		434,968	1.6
ROTOR	55,663	808	373,895	4,286	316	434,900	
CONTROL CABLES	-	•=	-	S	-		
EJECTION SEAT		-	1 2	-	-	194,464	0.7
FABRIC/RUBBER/PLASTICS	191,399	3,065	-	-		194,464	
FLIGHT CONTROLS & SUBASSM.	1 -	=	-	-			0.4
FUEL CONTROLS & ACCESSORIES	3,923	55,664	31,927	5,068	-	96,582	2000
GROUND SUPPORT EQUIPMENT	283,866	-	336,156	398,369	188,519	1,206,910	4.6
LANDING GEAR	_		7	-	-	-	-
MECHANICAL MODS. & REPAIR	1 -	-	2	-	-	-	-
COMPRESSOR/TURBINE/ENGINE METAL REPAIR		_	_	-	-	-	-
CYLINDER & PISTON	-	-	-		7.2	64.550	0.
PROTOTYPE	3,874	24	1,425	14,946	44,311	64,580	0.
N 84 70 80 80 00 00 00 00 00 00 00 00 00 00 00	_	_	-	-	-	-	
FIELD SERVICE		-	-	(=)	-	-	
HELO. DYNAMIC COMPONENTS	15,394,622	1,579,708	5,079,425	2,523,597	1,942,996	26,520,348	100
TOTAL %	58.0	6.0	19.2	9.5	7.3	100.0	

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MT PROGRAM FUNCTIONAL	AIRCRAFT REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	%
CATEGORY			31,183	-	452,925	2.4
EXAMINATION/EVALUATION	396,999	24,743		10,339	2.235,096	12.0
DISASSEMBLE/ASSEMBLE	1,986,150	168,806	69,801	11,411	4,817,046	25.8
ELECTRICAL/ELECTRONIC	1,359,509	2,929,895	516,231		808,537	4.3
HYDRAULICS/PNEUMATICS	82,976	699,479	26,082		194,158	1.0
BONDING	191,712	2,389	57	11,356	806,364	4.3
STRIP/FINISH/PAINT	581,799	152,243	60,966	6,908	84,209	0.5
WELD	24,453	42,840	10,008	9360		6.3
MACHINE	229,819	560,062	161,941	225,197	1,177,019	
WIRE CUT/MANUFACTURING 1						0.3
FORGE/FOUNDRY	2,609	6,330	37,929	16,118	62,986	0.9
LAYOUT/PATTERN	14,915	2,214	115,293	27,247	159,669	16.1
SHEET METAL	2,436,441	90,912	375,042	107,674	3,010,069	
CLEAN, ABRASIVE	2,981	162,334	505	-	165,820	0.9
CLEAN, CHEMICAL	478,696	5,209	17,404	20	501,329	2.7
HEAT TREAT	24,454	42,841	10,007	6,907	84,209	0.5
PLATING	71,451	130,086	19,732	22,703	243,972	1.3
PACKING/PRESERVATION	125 410	117,544	190,937	1,428	435,319	2.3
CALIBRATION	78	163,377	168,146		331,601	1.8
- Christian service	790,602	79,584	48,379	5,301	923,866	4.9
TESTING	750,002	8/957				
MISCELLANEOUS-	184,924	78,895	22,831	1,696	288,364	1.5
ARMAMENT	27,331	182,353	4,378	72	214,134	1.1
BEARINGS	27,331	1000000	-	122	20	= =
BLADES - PROP	-	39,881	3,232	4,183	110,912	0.6
ROTOR	63,616	13,296	5,884	11,847	56,775	0.3
CONTROL CABLES	25,748	13,230	200	-	-	-
EJECTION SEAT	-	25 572	22,251	28,956	198,261	1.1
FABRIC/RUBBER/PLASTICS	121,482	25,572		_	_	-
FLIGHT CONTROLS & SUBASSM.				-	-	-
FUEL CONTROLS & ACCESSORIES	=		7,571	-	64,978	0.3
GROUND SUPPORT EQUIPMENT	2,260	55,147	3,842	454	218,380	1.3
LANDING GEAR	129,592	84,492	3,642	_		12
MECHANICAL MODS. & REPAIR	-	-	-	_	_	-
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	-		_	_	_	-
CYLINDER & PISTON	-	-		_	_	-
PROTOTYPE	-	-			258,144	1.
FIELD SERVICE	974	154	257,016		777,403	4
HELO. DYNAMIC COMPONENTS	18,523	729,689	. 29,191	400.017	75/00/00/00/00/00	100
Charles and the	9,375,522	6,590,367	2,215,839	499,817	18,681,545	
TOTAL %	50.2	35.3	11.9	2.7	100.0	

NAVAIREWORKFAC PENSACOLA DIRECT LABOR (DOLLARS) 1 JAN 78 – 30 JUN 78 (FACTORED FROM 1 JAN 78 – 10 JUN 78 DATA)

NOTES: 1 INCLUDED IN ELECTRICAL/ELECTRONIC

TOTAL DIRECT LABOR (DOLLARS) 1 JUL 77 – 31 DEC 77

MT PROGRAM FUNCTIONAL	AIRCRAFT	MISSILE	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	%	COST DRIVER RANKING
CATEGORY	newow.	NAME OF THE OWNER OWNER OF THE OWNER O		762,433	379,512	25,017	3,991,517	36	8
XAMINATION/EVALUATION	2,120,033	39,022	665,500	913,802	841,380	26,889	18,499,531	16.7	2
DISASSEMBLE/ASSEMBLE	12,953,433	207,373	3,556,804	11,933,518	1,672,949	161,347	22,138,430	20.0	1
ELECTRICAL/ELECTRONIC	7,738,799	122,854	508,963	3,542,993	174,484	7,669	5,231,291	4.7	6
HYDRAULICS/PNEUMATICS	772,580	0	733,565	3,400,700,000,00	20,861	13,160	892,758	0.8	21
BONDING	394,101	194	1,565	462,877	298,514	159,243	4,453,218	4.0	7
STRIP/FINISH/PAINT	3,109,421	28,631	163,593	693,816	100,011	121 668	1 007,142	0 9	19
WELD	169,413	184	336,739	279,127	585,815	1.384.275	6,698,883	6.0	5
MACHINE	1,200,756	2,322	1,543,705	1,982,010	86,564	829,927	1,387,450	1.3	15
WIRE CUT/MANUFACTURING	200,904	11,384	14,301	244,370	46,162	140,487	233,881	0.2	30
FORGE/FOUNDRY	20,553	75	6,956	19,648	147,757	302,902	507,714	0.5	27
LAYOUT/PATTERN	44,263	76	222	12,494		1	15,322,520	13.8	3
SHEET METAL	11,188,266	393	239,662	1,432,583	1,854,982	606,634 16,960	1,222,345	1.1	17
CLEAN, ABRASIVE	315,432	6,918	279,896	546,087	57,052	6,665	1,411,315	1.3	13
CLEAN, CHEMICAL	918,422	12,156	158,621	255,632	59,819	110-000	458,182	0.4	28
HEAT TREAT	35,204	0	83,830	240,124	19,427	79,597	1,260,848	1.1	16
PLATING	204,621	9,341	250,934	663,463	63,283	69,206	V Seramonus	1.9	12
PACKING/PRESERVATION	216,228	19	114,981	752,420	975,287	29,625	2,088,560	31	9
CALIBRATION	97,913	111	128	1,382,978	1,933,339	443	3,414,912	6.9	4
PRIDENTA CHARLEST MICHARDS	4,783,520	716,112	710,728	760,490	670,484	28,736	7,670,070	6.9	1
TESTING			1						11
MISCELLANEOUS-	757,463	470,199	38,244	891,356	197,011	9,692	2,363,965	2.1	22
ARMAMENT	44,057		82,397	421,016	46,498	227,082	821,050	0.7	26
BEARINGS	14,481	1	219,864	234,188	49,265	-	517,799	0.5	20
BLADES - PROP	127,259		808	820,937	12,655	4,499	966,158	0.9	36
ROTOR	26,702	-	-	16,534	6,148	12,187	61,571	0.1	
CONTROL CABLES	80,319		9,029	103,720	30,683	2,075	225,826	0.2	31
EJECTION SEAT	719,400		10,658	186,581	73,398	91,190	1,081,227	1.0	18
FABRIC/RUBBER/PLASTICS	377,644		28	5,385	10,091	120	393,148	0 4	29
FLIGHT CONTROLS & SUBASSM.	V-0-0-00000000000000000000000000000000		425,047	458,196	102,674	3,445	1,406,959	1.3	14
FUEL CONTROLS & ACCESSORIES	417,597		222	1,470,575	539,303	200,757	2,535,057	2.3	10
GROUND SUPPORT EQUIPMENT	324,200		4,359	308,941	29,032	5,640	622,622	0.6	25
LANDING GEAR	274,650		_	_	76,064	-	76,480	0.1	34
MECHANICAL MODS. & REPAIR	416		166,392	41,887	3,254		211,685	0.2	32
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	152		53,549	29,329	1,522	2	84,400	0.1	33
CYLINDER & PISTON	3-9-0	1	53,549	1,425	14,946	44,311	64,580	9.1	35
PROTOTYPE	3,874	(2)		158,650	436,814	33,056	633,800	0.6	24
FIELD SERVICE	4,974	-	306	729,689	29,191	-	777,403	0.7	23
HELO. DYNAMIC COMPONENTS	18,523	3=1	(7.)	2003 903550	11,646,231	4.644.384	110.734,447	100.0	
1 - 15 (15 (15 (15 (15 (15 (15 (15 (15 (15	49,675,573	1,627,365	10,381,620	32,759,274	10.5	4,644,364	100.0	1	
TOTAL %	44.9	1.5	9.4	29.6	10.5	4.2			

MT NAVAIREWORKFAC FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	(24,305)	12,189	468	25,600		-	13,952	0.1
DISASSEMBLE/ASSEMBLE	118,084	144,218	158,347	568,112	840,008	1,144,152	2,972,921	16.7
ELECTRICAL/ELECTRONIC	166,502	133,350	210,158	371,466	1,563,176	165,258	2,609,910	14.6
HYDRAULICS/PNEUMATICS	141,216	21,060	90,970	320,934	555,015	283,410	1,412,605	7.9
BONDING	91,786	568	4	-	32	3,081	95,467	0.5
STRIP/FINISH/PAINT	12,946	107,571	6,340	10,076	717	226,119	363,769	2.0
WELD	147,117	1,773	25,836	5,272	4,250	52,462	236,711	1.3
MACHINE	2,548	26,257	4,239	64,220	393,196	15,993	506,453	2.8
WIRE CUT/MANUFACTURING	49	10,036	11,942	62,676	45,035	-	129,689	0.7
FORGE/FOUNDRY	608	1,529	95	-	12	2=	2,232	0.0
LAYOUT/PATTERN	609	3,436	-	2,240	23	2,376	8,684	0.0
SHEET METAL	356,746	136,176	283,111	389,806	1,195,396	607,738	2,968,973	16.6
CLEAN, ABRASIVE	131	2,857	-	1,652	5,242	_	9,882	0.1
CLEAN, CHEMICAL	132	39,879	20	_	12		40,011	0.2
HEAT TREAT	631		2	-	16,870	-	17,503	0.1
PLATING	33	4,815	2	13,574	-	_	18,424	0,1
PACKING/PRESERVATION	0	1,249	15	-	2,786	361	4,411	0.0
CALIBRATION	0	46	-	1,798	158,463	273	160,580	0.9
TESTING	220,699	2,955	66,796	99,968	383,002	314,728	1,088,148	6,1
MISCELLANEOUS-					24.000			
ARMAMENT	36,467	14,965	9,106	24,492	289,794	392,124	766,948	4.3
BEARINGS	23,271	333	26,220	-	-	104,890	154,714	0.9
BLADES - PROP	_	-	-	25,362	E	Ψ.	25,362	0.1
ROTOR		2,911	-		173,118	298,395	474,424	2.7
CONTROL CABLES		4	5	_	25-4	43,214	43,219	0.2
EJECTION SEAT	2	<u> </u>	10,101	69,356	-	-	79,457	0.4
FABRIC/RUBBER/PLASTICS	43,373	57,723	36,739	24,448	606,970	221,991	991,244	5.6
FLIGHT CONTROLS & SUBASSM.	-	-	123,159	-	5 = T	<u> </u>	123,159	0.7
FUEL CONTROLS & ACCESSORIES	_	_	3,484	187,878	21,554		212,916	1.2
GROUND SUPPORT EQUIPMENT	17,839	49	172	654	865,578	2,340	886,632	5.0
LANDING GEAR	174,267	6,024	138,766	164,988	-	564,387	1,048,432	5.9
MECHANICAL MODS. & REPAIR		=	-	_	-	=:	2 -	_
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	-		-	-	52	-	-	-
CYLINDER & PISTON	-	-	2	-	(me	-		-
PROTOTYPE		_	-	-	347	-	347	0.0
FIELD SERVICE	-		-	-	100	70	70	0.0
HELO. DYNAMIC COMPONENTS	-	× -:	-	-	-	369,644	369,644	2.1
TOTAL	1,530,701	731,969	1,206,073	2,434,572	7,120,572	4,813,006	17,836,893	100.0
%	8.6	4.1	6.8	13.6	39.9	27.0	100.0	

AIRCRAFT REWORK DIRECT MATERIAL (DOLLARS) 1 JUL 77 – 31 DEC 77

MT NAVAIREWORKFAC				
FUNCTIONAL CATEGORY	ALAMEDA	NORFOLK	TOTAL	%
EXAMINATION/EVALUATION	0	_		_
DISASSEMBLE/ASSEMBLE	25,826	_	25,826	1.6
ELECTRICAL/ELECTRONIC		190,672	190,672	11.5
HYDRAULICS/PNEUMATICS	_	-	_	-
BONDING	0	-	_	_
STRIP/FINISH/PAINT	0		_	2
WELD	o	_	7.	-
MACHINE	0	-	-	-
WIRE CUT/MANUFACTURING	14	41,802	41,816	2.5
FORGE/FOUNDRY	0		_	-
LAYOUT/PATTERN	0	· -	-	
SHEET METAL	0	_		_
CLEAN, ABRASIVE	0	_	_	-
CLEAN, CHEMICAL	0	-		-
HEAT TREAT	0	-	-	-
PLATING	0	968	968	0.1
PACKING/PRESERVATION	0	-	_	-
CALIBRATION	0	146	146	0.0
TESTING	48,748	5,096	53,844	3.3
MISCELLANEOUS-				
ARMAMENT	0 -2	1,342,924	1,342,924	81.1
BEARINGS	-	-	-	
BLADES - PROP	022	1	-	-
ROTOR	-	1.7	11 (177)	· -
CONTROL CABLES	-	-	_	:-
EJECTION SEAT	-	1 2	<u>-</u>	102
FABRIC/RUBBER/PLASTICS	-	-	æ	₹.
FLIGHT CONTROLS & SUBASSM.	_	-	-	0-
FUEL CONTROLS & ACCESSORIES	-	-	-	-
GROUND SUPPORT EQUIPMENT		- " L	o π	-
LANDING GEAR	-		: =	
MECHANICAL MODS. & REPAIR		-	19 77	-
COMPRESSOR/TURBINE/ENGINE METAL REPAIR		_	-	-
CYLINDER & PISTON	50	1 2	72	122
PROTOTYPE		-	1 	-
FIELD SERVICE	200	-	:	
HELO. DYNAMIC COMPONENTS	=	-	· · · · · ·	-
TOTAL	74,588	1,581,608	1,656,196	100.0
%	4.5	95.5	100.0	Ē

MISSILE REWORK DIRECT MATERIAL (DOLLARS) 1 JUL 77 – 31 DEC 77

ENGINE REWORK DIRECT MATERIAL (DOLLARS) 1 JUL 77 – 31 DEC 77 FIGURE A-23

MT NAVAIREWORKFAC	ALAMEDA	CHERRY	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
CATEGORY EXAMINATION/EVALUATION	495	19,905	174	766,868			787,442	3.4
	1,240,599	2,535,514	1,343,384	2,940,172	456,427		8,526,096	36.3
DISASSEMBLE/ASSEMBLE	25,928	74,365	17,514	76,916	111,163		305,886	1.3
ELECTRICAL/ELECTRONIC	0.0000000000000000000000000000000000000	485,462	93,287	354,250	-		1,738,615	7.4
HYDRAULICS/PNEUMATICS	805,616	405,402		_	-		-	-
BONDING	-	146,692	5,332	_	-		152,024	0.6
STRIP/FINISH/PAINT			18,580	43,698	29,297		218,077	0.9
WELD	-	126,502	92,057	20,456	650,186		1,303,802	5.6
MACHINE	61,134	479,969	20,964	2,308	408		51,897	0.2
WIRE CUT/MANUFACTURING	100	28,217	20,964	2,500	2002 I		10,734	0.0
FORGE/FOUNDRY	- 1	10,734	-		-		459	0.0
LAYOUT/PATTERN	12	459			101,696		497,592	2.1
SHEET METAL	4,978	385,010	5,908	_	5,244		144,433	0.6
CLEAN, ABRASIVE	8	134,152	5,037		2,372	1	151,257	0.6
CLEAN, CHEMICAL	-	148,885	-		1,190,758		1,190,767	5.1
HEAT TREAT		(9		1,150,720		99.146	0.4
PLATING	560	80,142	204	18,800	- 44		208,978	0.9
PACKING/PRESERVATION	-	157,261	51,673	-	77		2,210	0.0
CALIBRATION	2,210	72	-	-	240 712	×	1,286,449	5.5
TESTING	6	654,183	360,863	21,684	249,713	REWORK	CHATCHOUSE:	
MISCELLANEOUS-						e e	48,248	0.2
ARMAMENT		*	15	2,012	46,236	ä	625,235	2.7
BEARINGS	446,605	85,921	92,709		(#.2	ENGINE	11,952	0.1
BLADES - PROP		-	941	11,952	1 7	Z Z	200000000	0.1
ROTOR		=:	-	-	30,545	9	30,545	
CONTROL CABLES	_		5-5	-	-			
EJECTION SEAT	_	-	(3	-	-		-	0.5
FABRIC/RUBBER/PLASTICS	_	10,611	174	-	115,143		125,928	0.5
FLIGHT CONTROLS & SUBASSM.	-	-		-	-			7.4
FUEL CONTROLS & ACCESSORIES	_	2	399,015	1,143,174	192,866		1,735,055	10000
	70	1946	-	+	259,333		259,403	1.1
GROUND SUPPORT EQUIPMENT	_ 339	-	-	2	-	N/		-
LANDING GEAR	_	-	_	-			**	
MECHANICAL MODS. & REPAIR	_	-	3,247,192	Ψ.	7.0		3,247,192	13.8
COMPRESSOR/TURBINE/ENGINE METAL REPAIR			730,047		2.1		730,047	3.
CYLINDER & PISTON			730,047	5	20		-	
PROTOTYPE		_			-		2	100
FIELD SERVICE	-		(= FA)				-	
HELO. DYNAMIC COMPONENTS	-	=		E 402 300	3,451,431		23,489,469	100
TOTAL	2,587,641	5,563,984	6,484,123 27.6	5,402,290	14.7		100.0	
%,	11.0	23.7	27.0	25.0	100000			

COMPONENT F/E MATERIAL DIRECT MATERIAL (DOLLARS) 1 JUL 77 – 31 DEC 77

MT NAVAIREWORKFAC FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	60,802	170,521		33,870		_	265,193	0.5
DISASSEMBLE/ASSEMBLE	38,218	1,096,101	717	768,118	438,590	183,263	2,525,007	4.7
ELECTRICAL/ELECTRONIC	1,625,652	1,880,941	2,743,701	1,541,276	2,847,542	2,600,072	13,239,184	24.4
HYDRAULICS/PNEUMATICS	2,975,811	942,196	669,661	434,652	1,909,851	2,381,568	9,313,739	17.2
BONDING	27,311	261,563	-	-	219,942	513	509,329	0.9
STRIP/FINISH/PAINT	1,086	261,959	192	1,410	7	1,108	265,762	0.5
WELD	16,832	95,054	16,812	4,992	48,160	12,944	194,794	0.4
MACHINE	10,899	524,149	7,484	66,786	1,703,553	2,497,154	4,810,025	8.9
WIRE CUT/MANUFACTURING	- 5	30,173	28,753	28,746	45,419	_	133,091	0.2
FORGE/FOUNDRY	359	14,234	2,785	_	32	-	17,410	0.0
LAYOUT/PATTERN	359	11,945	-	2	7-2	61	12,365	0.0
SHEET METAL	242,892	721,624	184,417	203,448	484,710	175,478	2,012,569	3.7
CLEAN, ABRASIVE	535	234,666	-	23,838	14,600	- 1	273,639	0.5
CLEAN, CHEMICAL	535	241,416		_	3,305	_	245,256	0.5
HEAT TREAT	28,990	-	-	_	224,641	-	253,631	0.5
PLATING	0	156,481	7=	31,262	216		187,959	0.3
PACKING/PRESERVATION	291,113	350,402		191	-	54,646	696,161	1.3
CALIBRATION	75,663	52,009	154,643	165,810	950,316	135,302	1,533,743	2.8
TESTING	93,662	383,717	-	49,446	236,335	1,699	764,859	1.4
MISCELLANEOUS-								
ARMAMENT	631,357	83,880	302,397	154,896	299,320	125,703	1,597,553	2.9
BEARINGS	239,326	122,714	181,680		-	1,130,201	1,673,921	3.1
BLADES - PROP	_	-	52,426	201,380	-		253,806	0.5
ROTOR		674,557	_	50.4555	2,704,724	48,707	3,427,988	6.3
CONTROL CABLES	-	-	197	-	-	22,476	22,673	0.0
EJECTION SEAT	_	_	8,063	44,076	- 2	=	52,139	0.1
FABRIC/RUBBER/PLASTICS	4,913	69,411	73,034	25,554	-	12,661	185,573	0.3
FLIGHT CONTROLS & SUBASSM.	- 1,5 (,5	_	23,233	-1	-	-	23,233	0.0
FUEL CONTROLS & ACCESSORIES		_	664,557	355,402	188,727	-	1,218,686	2.2
GROUND SUPPORT EQUIPMENT	488,950	98,654	18,545	237,964	782,389	81,894	1,708,396	3,1
LANDING GEAR	228,789	127,896	190,954	74,092	1 2	480,221	1,101,952	2.0
MECHANICAL MODS. & REPAIR		12	110000000	2			11.5000 F30000 1441	1344
COMPRESSOR/TURBINE/ENGINE METAL REPAIR		-	891,603	-		-	891,603	1.6
CYLINDER & PISTON	-	V =	296,685	-	12	72	296,685	0.5
PROTOTYPE		18	μ μ	122	132	-	132	0.0
FIELD SERVICE	<u> </u>	82	-	-	-	: Dec	5 4	-
HELO, DYNAMIC COMPONENTS	-	0-	-	-		4,568,805	4,568,805	8.4
TOTAL	7,084,054	8,606,263	6,512,539	4,457,018	13,102,511	14,514,476	54,276,861	100.0
%	13,1	15.9	12.0	8.2	24.1	26.7	100.0	

OTHER SUPPORT DIRECT MATERIAL (DOLLARS) 1 JUL 77 – 31 DEC 77

MT NAVAIREWORKFAC FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
EXAMINATION/EVALUATION	27,512	103,946	(34)	2,934	39,590	-	173,948	2.9
DISASSEMBLE/ASSEMBLE	3,242	33,797	10,806	32,006	199,222	7,424	286,497	4.7
ELECTRICAL/ELECTRONIC	42,145	22,800	22,900	225,850	313,472	356,076	983,243	16,3
HYDRAULICS/PNEUMATICS	17,223	3,899	12,845	48,784	44,633	15,713	143,097	2.4
BONDING	2,697		_	0.000	63		2,760	0.0
STRIP/FINISH/PAINT	36	228	6,533	4,116	_	4,756	15,669	0.3
WELD	47	21	8,245	7,700	27,183	962	44,158	0.7
MACHINE	1,150	1,193	4,267	21,156	117,121	33,693	178,580	3.0
WIRE CUT/MANUFACTURING	544	3,144	1,251	250,388	54,703		309,486	5.1
FORGE/FOUNDRY	315		190		12	_	517	0.0
LAYOUT/PATTERN	315	_	-	- F	3	24,078	24,396	0.4
SHEET METAL	42,688	16,332	22,642	416,844	121,350	191,649	811,505	13.4
CLEAN, ABRASIVE	2012-01-00-00 11-00-0	399	_		2,375		2,774	0.0
CLEAN, CHEMICAL	0	654	_	60,808	94		61,462	1.0
HEAT TREAT	С	-	-	708600000 =	6,596	_	6,596	0.1
PLATING	18	9	-	6,738	10	_	6,775	0.1
PACKING/PRESERVATION	22,503	899	151,261	_	294,908	171	469,742	7.8
CALIBRATION	190,019	22,708	66,546	32,830	464,781	26,853	803,737	13.3
TESTING	25,748	1,334	22,043	45,586	324,409	12,433	431,553	7.1
MISCELLANEOUS-	38.	VANGE		10000000	97.6255			145500
ARMAMENT	343	6,093	251,941	71,062	6,848	5,483	341,770	5.7
BEARINGS	634	120	3,992	=		2,215	6,961	0.1
BLADES - PROP	1	-	1.E	-	_	-	-	-
ROTOR	72	_	S =		8,190	393	8,583	0.1
CONTROL CABLES	-	¥3	39	20	16	4,454	4,493	9.1
EJECTION SEAT	-	-	481	49,230	_		49,711	0.8
FABRIC/RUBBER/PLASTICS	4,891	-	2,565	2,854		16,916	27,226	0.5
FLIGHT CONTROLS & SUBASSM.		-	2,381			-	2,381	0.0
FUEL CONTROLS & ACCESSORIES	_	-	1,265	228,502	18,147		247,914	4.1
GROUND SUPPORT EQUIPMENT	7,625		43,781	3,688	466,603	9,817	531,514	8.8
LANDING GEAR	652	140	226	6,792	-	10,984	18,654	0.3
MECHANICAL MODS. & REPAIR	-	_	-	_	-		Matheway .	222
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	::01	-	39,567	-	-	R#	39,567	0.7
CYLINDER & PISTON		-	-	21	24	-	-	9
PROTOTYPE	546	= = = = = = = = = = = = = = = = = = = =	-	240	583	-	583	0.0
FIELD SERVICE		— — — — — — — — — — — — — — — — — — —	-	>	-	3,540	3,540	0.1
HELO. DYNAMIC COMPONENTS	-	-	7-		-	3,983	3,983	0.1
TOTAL	389,803	217,576	675,733	1,517,868	2,510,802	731,593	6,043,375	100.0
%	6.5	3.6	11.2	25.1	41.5	12.1	100.0	

MANUFACTURING DIRECT MATERIAL (DOLLARS) 1 JUL 77 – 31 DEC 77

MT NAVAIREWORKFAC FUNCTIONAL	ALAMEDA	CHERRY	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
CATEGORY	314,601	32	119		-	-	314,752	6.9
EXAMINATION/EVALUATION	24	80	23	-	58,117	1,603	59,847	1.3
DISASSEMBLE/ASSEMBLE		419	2,541	100	88,978	29,943	129,387	2.8
ELECTRICAL/ELECTRONIC	7,406	413	4,265	10	559	2,338	7,453	0.2
HYDRAULICS/PNEUMATICS	281	6		(4) (4) (4) (4) (4) (4) (4) (4) (4) (4)	601	- 1	1,825	0.0
BONDING	1,218		6	177,556	6	101	177,819	3.9
STRIP/FINISH/PAINT	0	150	120	73,106	3,913	2	78,740	1.7
WELD	20	1,581	22,805	155,284	187,056	38,472	431,142	9.4
MACHINE	20,665	6,860	(1700001120.5	102,646	2,595,931	-	2,722,447	59.6
WIRE CUT/MANUFACTURING	=	387	23,483	-200000000	13,294	31	16,651	0.4
FORGE/FOUNDRY	1,745	1,581	1.77	-	6,601	1,315	14,256	0.3
LAYOUT/PATTERN	1,745	143	_	4,452	208,769	32,535	426,703	9.3
SHEET METAL	27,944	4,760	17,295	135,400	200,705	52,000	168	0.0
CLEAN, ABRASIVE	0	164		5=	,		14,294	0.3
CLEAN, CHEMICAL	0	278	-	14,016		_	80	0.0
HEAT TREAT	42	-	14	-	24	-	5,093	0.1
PLATING	0	333	-	4,760	1000		29,712	0.7
PACKING/PRESERVATION .	577	0 70	28,986	-	149	_	1,998	0.0
CALIBRATION	-	-	949	210	1,788	-	30,552	0.7
TESTING	606	=	(+) 8	3,764	26,182	-	30,552	0.7
MISCELLANEOUS-							14.005	0.3
ARMAMENT	0		-	14,906	(H)	7.	14,906	0.1
BEARINGS	3,329	-	703	-		673	4,705	0.,
BLADES - PROP	_	-	-		· =	-	-	-
ROTOR	_	_	-	-	111	1,266	1,377	0.0
		_	75	7-7	= 1	11,489	11,564	0.3
CONTROL CABLES		_	-	28,450	-	-	28,450	0.6
EJECTION SEAT	3,117	701	9,381	11,818	-	2,246	27,263	0.6
FABRIC/RUBBER/PLASTICS	- P		_	-	-	12	-	
FLIGHT CONTROLS & SUBASSM.	-		_	2	159	-	161	0.0
FUEL CONTROLS & ACCESSORIES		- 5	-	-		12	12	0.0
GROUND SUPPORT EQUIPMENT	0	115	_	_	-	46	405	0.0
LANDING GEAR	244	115		1 2		-		-
MECHANICAL MODS. & REPAIR	-	-	5.00		-	-		-
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	_	-	-			_	-	
CYLINDER & PISTON		_	-	-	14,098	_	14,098	9.3
PROTOTYPE	-	-			14,038	_	12	
FIELD SERVICE	200		=		1	-	1 2	
HELO. DYNAMIC COMPONENTS	-	-	=			122,070	4,565,860	100
TOTAL	383,564	17,590	109,816	726,480	3,206,340	50M0 (SSE2000)	100.0	
%	8.4	0.4	2.4	15.9	70.2	2.7	100.0	

TOTAL DIRECT MATERIAL (DOLLARS) 1 JUL 77 – 31 DEC 77

MT PROGRAM FUNCTIONAL CATEGORY	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%	COST DRIVER RANKING
EXAMINATION/EVALUATION	379,105	306,593	727	829,272	39,590	-	1,555,287	1.4	17
DISASSEMBLE/ASSEMBLE	1,425,993	3,809,710	1,513,277	4,308,408	2,002,364	1,336,442	14,396,194	13.3	2
ELECTRICAL/ELECTRONIC	1,867,633	2,111,875	2,996,814	2,406,280	4,929,331	3,151,349	17,458,282	16.2	1
HYDRAULICS/PNEUMATICS	3,940,147	1,452,617	871,028	1,158,630	2,510,058	2,683,029	12,615,509	11.7	3
BONDING	123,012	262,137	-		220,638	3,594	609,381	0.6	24
STRIP/FINISH/PAINT	14,068	516,600	18,403	193,158	730	232,084	975,043	0.9	22
WELD	164,017	224,931	69,593	134.768	112.803	66,368	772,480	0.7	23
MACHINE	96,396	1,038,428	130,852	327,902	3,051,112	2,585,312	7,230,002	6.7	4
WIRE CUT/MANUFACTURING	14	71,957	86,393	488,566	2,741,496	_	3,388,426	3.1	12
FORGE/FOUNDRY	3,027	28,078	3,070	-	13,338	31	47,544	0.0	33
LAYOUT/PATTERN	3,028	15,983	-	6,692	6,627	27,830	60,160	0.1	32
SHEET METAL	675,248	1,263,902	513,373	1,145,498	2,111,921	1,007,400	6,717,342	6.2	5
CLEAN, ABRASIVE	666	372,238	5,037	25,490	27,465	_	430,896	0.4	26
CLEAN, CHEMICAL	667	431,112	-	74,824	5,677	-	512,280	0.5	25
HEAT TREAT	29,663	-	25	-	1,438,889		1,468,577	1.4	18
PLATING	51	241,780	206	76,102	226	-	318,365	0.3	27
PACKING/PRESERVATION	314,193	509,811	231,935	=	297,887	55,178	1,409,004	1.3	19
CALIBRATION	267,892	74,763	221,189	200,794	1,575,348	162,428	2,502,414	2.3	14
TESTING	389,469	1,042,189	449,702	225,544	1,219,641	328,860	3,655,405	3.4	10
MISCELLANEOUS-	1			_					
ARMAMENT	668,167	104,938	563,444	1,610,292	642,198	523,310	4,112,349	3.8	8
BEARINGS	713,165	209,088	305,304		-	1,237,979	2,465,536	2.3	15
BLADES - PROP	41	+	52,426	238,694	- 4	_	291,120	0.3	28
ROTOR	-:	677,468	-	-	2,916,688	348,761	3,942,917	3.7	9
CONTROL CABLES	_	-	316	s=.	-	81,633	81,949	0.1	31
EJECTION SEAT	_		18,645	191,112	-	-	209,757	0.2	29
FABRIC/RUBBER/PLASTICS	56,294	138,446	121,893	64,674	722,113	253,814	1,357,234	1.3	20
FLIGHT CONTROLS & SUBASSM.	-	-	148,773	-	-	-	148,773	0.1	30
FUEL CONTROLS & ACCESSORIES	-	-	1,068,321	1,924,958	421,453	_	3,414,732	3.2	11
GROUND SUPPORT EQUIPMENT	514,484	98,703	62,498	242,306	2,373,903	94,063	3,385,957	3.1	13
LANDING GEAR	403,952	134,035	329,946	245,872	-	1,055,638	2,169,443	2.0	16
MECHANICAL MODS. & REPAIR	-	_	-	-	_	4	2		
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	-		4,178,362	-	-	-	4,178,362	3.9	1
CYLINDER & PISTON	7 :		1,026,732	-	-	-	1,026,732	1,0	21
PROTOTYPE	-	27	= -	-	15,160	(£	15,160	0.0	34
FIELD SERVICE	20	.=	==	720	-	3,610	3,610	0.0	35
HELO. DYNAMIC COMPONENTS	-	-	_	-	-	4,942,432	4,942,432	4.6	6
TOTAL	12,050,351	15,137,382	14,988,284	16,119,836	29,391,656	20,181,145	107,868,654	100.0	
%	11.2	14.0	13.9	14.9	27.2	18.7	100.0		1

NAVAIREWORKFAC ALAMEDA DIRECT MATERIAL (DOLLARS) 1 APR 77 – 30 SEP 77

MT PROGRAM FUNCTIONAL CATEGORY	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	'%.
EXAMINATION/EVALUATION	(24,305)	0	495	60,802	27,512	314,601	379,105	3,1
DISASSEMBLE/ASSEMBLE	118,084	25,826	1,240,599	38,218	3,242	24	1,425,993	11.8
ELECTRICAL/ELECTRONIC	166,502		25,928	1,625,652	42,145	7,406	1,867,633	15,5
HYDRAULICS/PNEUMATICS	141,216		805,616	2,975,811	17,223	281	3,940,147	32.7
BONDING	91,786	0	0	27,311	2,697	1,218	123,012	1.0
STRIP/FINISH/PAINT	12,946	0	0	1,086	36	0	14,068	0.1
WELD	147,118	0	0	16,832	47	20	164,017	1.4
MACHINE	2,548	0	61,134	10,899	1,150	20,665	96,396	0.8
WIRE CUT/MANUFACTURING 1	10000000	14	_		-	-	14	0.0
FORGE/FOUNDRY	1	1	1)	1	1	1	1	1
LAYOUT/PATTERN	1,217	0	1	718	630	3,490	6,055	0.1
SHEET METAL	356,746	, ,	4,978	242,892	42,688	27,944	675,248	5.6
CLEAN, ABRASIVE	1	1	1)	1	1	1	1	1
CLEAN, CHEMICAL	263	0	} 0	1,070	0	1)	1,333	0.0
HEAT TREAT	631	, ,	0	28,990	0	42	29,663	0.2
PLATING	33	0	0	0	18	0	51	0.0
PACKING/PRESERVATION	0	0	0	291,113	22,503	577	314,193	2.6
CALIBRATION	0	0	2,210	75,663	190,019	_	267,892	2.2
TESTING	220,699	48,748	6	93,662	25,748	606	389,469	3.2
MISCELLANEOUS-		170.0707555	*****		1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			
ARMAMENT	36,467	-	-	631,357	343	-	668,167	5.5
BEARINGS	23,271		446,605	239,326	634	3,329	713,165	5 9
BLADES - PROP	_	_	=	-	9	_	-	- 575
ROTOR	2	122		1±11	39	-	-	-
CONTROL CABLES		_		-	-		-	-
EJECTION SEAT	_	-	-		9	2	2	-
FABRIC/RUBBER/PLASTICS	43,373			4,913	4,891	3,117	56,294	0.5
FLIGHT CONTROLS & SUBASSM.	_		1 2	-	B	-	-	-
FUEL CONTROLS & ACCESSORIES	_	_	_	-	-	-	-	
GROUND SUPPORT EQUIPMENT	17,839	_	70	488,950	7,625	2	514,484	4.3
LANDING GEAR	174,267	_ =	9	228,789	652	244	403,952	3.4
MECHANICAL MODS. & REPAIR		-	_		2	-	-	-
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	<u> </u>		-	1-1	- 1		-	-
CYLINDER & PISTON	-	-	2	-	-		- 1	-
PROTOTYPE	29	-		-		325 4 3	-	-
FIELD SERVICE	-	-	-	-	-		9	-
HELO, DYNAMIC COMPONENTS				-	-	2	-	-
TOTAL	1,530,701	74,588	2,587,641	7,084,054	389,803	383,564	12,050,351	100.0
***	12.7	0.6	21.5	58.8	3.2	3.2	100.0	

NOTES

¹ INCLUDED IN ELECTRICAL/ELECTRONIC

	SHEET METAL
	CLEAN, ABRASIVE
	CLEAN, CHEMICAL
	HEAT TREAT 1
	PLATING
29	PACKING/PRESERVATION
	CALIBRATION
	TESTING
	MISCELLANEOUS-

MT PROGRAM FUNCTIONAL CATEGORY	AIRCRAFT REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	%
EXAMINATION/EVALUATION	12,189	19,905	170,521	103,946	32	306,593	2.0
DISASSEMBLE/ASSEMBLE	144,218	2,535,514	1,096,101	33,797	80	3,809,710	25.2
ELECTRICAL/ELECTRONIC	133,350	74,365	1,880,941	22,800	419	2,111,875	14.0
HYDRAULICS/PNEUMATICS	21,060	485,462	942,196	3,899	-:	1,452,617	9.6
BONDING	568	-	261,563	ike s	6	262,137	1.7
STRIP/FINISH/PAINT	107,571	146,692	261,959	228	150	516,600	3.4
WELD	1,773	126,502	95,054	21	1,581	224,931	1.5
MACHINE	26,257	479,969	524,149	1,193	6,860	1,038,428	6.9
WIRE CUT/MANUFACTURING	10,036	28,217	30,173	3,144	387	71,957	0.5
FORGE/FOUNDRY	1,529	10,734	14,234	02	1,581	28,078	0.2
LAYOUT/PATTERN	3,436	459	11,945	3.9	143	15,983	0.1
SHEET METAL	136,176	385,010	721,624	16,332	4,760	1,263,902	8.3
CLEAN, ABRASIVE	2,857	134,152	234,666	399	164	372,238	2.5
CLEAN, CHEMICAL	39,879	148,885	241,416	654	278	431,112	2.8
HEAT TREAT 1		_	-	o s	- 1		-
LATING	4,815	80,142	156,481	9	333	241,780	1,6
ACKING/PRESERVATION	1,249	157,261	350,402	899	_	509,811	3.4
CALIBRATION	46	-	52,009	22,708	- 1	74,763	0.5
ESTING	2,955	654,183	383,717	1,334	124	1,042,189	6.9
MISCELLANEOUS-						10:	
ARMAMENT	14,965	-	83,880	6,093	-	104,938	0.7
BEARINGS	333	85,921	122,714	120	100	209,088	1.4
BLADES – PROP	25	123	27	-	12	27	_
ROTOR	2,911	_	674,557	1/2	39	677,468	4.5
CONTROL CABLES	_	_	-	-	_	-	-
EJECTION SEAT	_	-	-	-	-	-	-
FABRIC/RUBBER/PLASTICS	57,723	10,611	69,411		701	138,446	0.9
FLIGHT CONTROLS & SUBASSM.	-	-	-	-	-	_	-
FUEL CONTROLS & ACCESSORIES		-	-	-	-	-	-
GROUND SUPPORT EQUIPMENT	49	-	98,654	- "	-	98,703	0.7
LANDING GEAR	6,024	-	127,896	-	115	138,446	0.9
MECHANICAL MODS. & REPAIR	2		-	(-)	-	_	-
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	-		_	- 1	-		-
CYLINDER & PISTON		-	-	2	-	-	-
PROTOTYPE	-	=	-	=	-		_
FIELD SERVICE	-	-	-	-	-	14 <u>-</u> 11	-
HELO. DYNAMIC COMPONENTS	-	T 2	-				
TOTAL	731,969	5,563,984	8,606,263	217,576	17,590	15,137,382	100.0
%	4.8	36.8	56.9	1.4	0.1	100.0	-

NAVAIREWORKFAC CHERRY POINT DIRECT MATERIAL (DOLLARS) 1 JUL 77 - 31 DEC 77

NOTES:

¹ INCLUDED IN SHEET METAL/WELD/FORGE/FOUNDRY

MT PROGRAM FUNCTIONAL CATEGORY	AIRCRAFT REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	%
EXAMINATION/EVALUATION	468	174	-	(34)	119	727	0.0
DISASSEMBLE/ASSEMBLE	158,347	1,343,384	717	10,806	23	1,513,277	10.1
ELECTRICAL/ELECTRONIC	210,158	17,514	2,743,701	22,900	2,541	2,996,814	20.0
HYDRAULICS/PNEUMATICS 1	90,970	93,287	669,661	12,845	4,265	871,028	5.8
BONDING ²	-	-	-	-	-	-	-
STRIP/FINISH/PAINT	5,340	5,332	192	6,533	6	18,403	0.1
WELD	25,836	18,580	16,812	8,245	120	69,593	0.5
MACHINE	4,239	92,057	7,484	4,267	22,805	130,852	0.9
WIRE CUT/MANUFACTURING	11,942	20,964	28,753	1,251	23,483	86,393	0.6
FORGE/FOUNDRY	95	-	2,785	190	-	3,070	0.0
LAYOUT/PATTERN 3	21	-	4	=	_	72	-
SHEET METAL	283,111	5,908	184,417	22,642	17,295	513,373	3.4
CLEAN, ABRASIVE	-	5,037	-	2	₩	5,037	0.0
CLEAN, CHEMICAL ⁴		-	-	40.00			-
HEAT TREAT	2	9	-	-	14	25	0.0
PLATING	2	204	-	_	-	206	0.0
PACKING/PRESERVATION	15	51,673	_	151,261	28,986	231,935	1.5
CALIBRATION		-	154,643	66,546		221,189	1.5
TESTING	66,796	360,863	_	22,043	-	449,702	3.0
MISCELLANEOUS-	2000					5	-
ARMAMENT	9,106		302,397	251,941	_	563,444	3.8
BEARINGS	26,220	92.709	181,680	3,992	703	305,304	2.0
BLADES - PROP		(E)	52,426	4		52,426	0.3
ROTOR		-	_	20	_	25-25-25-25-25-25-25-25-25-25-25-25-25-2	
CONTROL CABLES	5	4.0	197	39	75	316	0.0
EJECTION SEAT	10,101		8,063	481	_	18.645	0.1
FABRIC/RUBBER/PLASTICS	36,739	174	73,034	2,565	9,381	121,893	0.8
FLIGHT CONTROLS & SUBASSM.	123,159	-	23,233	2,381	_	148,773	1.0
FUEL CONTROLS & ACCESSORIES	3,184	399,015	664,557	1,265		1,068,321	7.1
GROUND SUPPORT EQUIPMENT	172	-	18,545	43,781	-	62,498	0.4
LANDING GEAR	138,766	_	190,954	226	_	329,946	2.2
MECHANICAL MODS. & REPAIR	130,100	122	4.	_	-	_	
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	-	3,247,192	891,603	39,567	-	4,178,362	27.9
CYLINDER & PISTON		730,047	296,685	,ee);	-	1,026,732	6.9
PROTOTYPE	-	140 marketin	-		-	-:	1
FIELD SERVICE	-	-	-	40	-	-:	
HELO. DYNAMIC COMPONENTS				40	12	-	-
TOTAL	1,206,073	6,484,123	6,512,539	675,733	109,816	14,988,284	100.0
	8.0	43.3	43.5	4.5	0.7	100.0	-

NAVAIREWORKFAC JACKSONVILLE DIRECT MATERIAL (DOLLARS) 1 JUL 77 – 31 DEC 77

NOTES:

¹ NO PNEUMATICS

² INCLUDED IN PLASTICS

³ INCLUDED IN SHEET METAL

⁴ INCLUDED ELSEWHERE

NAVAIREWORKFAC NORFOLK DIRECT MATERIAL (DOLLARS) 1 APR 78 – 30 SEP 78 (FACTORED FROM 1 JUL 78 – 30 SEP 78 DATA)

MT PROGRAM FUNCTIONAL CATEGORY	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%
EXAMINATION/EVALUATION	25,600	_	766,368	33,870	2,934		829,272	5.1
DISASSEMBLE/ASSEMBLE	568,112	4	2,940,172	768,118	32,006	-	4,308,408	26.7
ELECTRICAL/ELECTRONIC	371,466	190,672	76,916	1,541,276	225,850	100	2,406,280	14.9
HYDRAULICS/PNEUMATICS	320,934	+9	354,250	434,652	48,784	10	1,158,630	7.2
BONDING	-		_		-	- 1	-	-
STRIP/FINISH/PAINT	10,073	,-	_	1,410	4,116	177,556	193,158	1.2
WELD	5,272		43,698	4,992	7,700	73,106	134,768	0.8
MACHINE	64,220		20,456	66,786	21,156	155,284	327,902	2.0
WIRE CUT/MANUFACTURING	62,676	41,802	2,308	28,746	250,388	102,646	488,566	3.0
FORGE/FOUNDRY	1 21		_	2	-	-	14	-
LAYOUT/PATTERN	2,240	-	-	_		4,452	6,692	0.0
SHEET METAL	389,806		-	203,448	416,844	135,400	1,145,498	7.1
CLEAN, ABRASIVE	1,652		-	23,838	\ 	-	25,490	0.2
CLEAN, CHEMICAL	-	-	-		60,808	14,016	74,824	0.5
HEAT TREAT		=7.	-	3	-	941	100	-
PLATING	13,574	968	18,800	31,262	6,738	4,760	76,102	0.5
PACKING/PRESERVATION	(40	-	-	_	-	-	1 -	-
CALIBRATION	1,798	146	-	165,810	32,830	210	200,794	1.2
TESTING	99,968	5,096	21,624	49,446	45,586	3,764	225,544	1.4
MISCELLANEOUS-								
ARMAMENT	24,492	1,342,924	2,012	154,896	71,062	14,906	1,610,292	10.0
BEARINGS		-	1 =		=	-	12 12	-
BLADES - PROP	25,362	20	11,952	201,380		-	238,694	1.5
ROTOR	-	-	-	1 120 miles	-		-	-
CONTROL CABLES	-	=		-	-	-	-	-
EJECTION SEAT	69,356	-	_	44,076	49,230	28,450	191,112	1.2
FABRIC/RUBBER/PLASTICS	24,448	-	_	25,554	2,854	11,818	64,674	0.4
FLIGHT CONTROLS & SUBASSM.	-	_	_	_	-			1 2
FUEL CONTROLS & ACCESSORIES	187,878	-	1,143,174	365,402	228,502	2	1,924,958	11.9
GROUND SUPPORT EQUIPMENT	654	622 622	_	237,964	3,688	_	242,306	1.5
LANDING GEAR	164,983	990	2	74,092	6,792	-	245,872	1.5
MECHANICAL MODS. & REPAIR	-	=	_	10000000	-	-	-1	-
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	(-)	-	-	-	-	-		-
CYLINDER & PISTON	-	-	-	-	-	-	. 	-
PROTOTYPE		· -	-	-		-		-
FIELD SERVICE	5 	-	-	-	-	4	-	-
HELO. DYNAMIC COMPONENTS	-	-	-	-	-		-	2
TOTAL	2,434,572	1,581,608	5,402,290	4,457,018	1,517,868	726,480	16,119,836	100.0
70	15.1	9.8	33.5	27.6	9.4	4.5	100.0	-

NAVAIREWORKFAC NORTH ISLAND DIRECT MATERIAL (DOLLARS) 1 JUL 77 – 31 DEC 77 (FACTORED FROM 1 JUL 77 – 1 JUL 78 DATA)

MT PROGRAM FUNCTIONAL CATEGORY	AIRCRAFT REWORK	ENGINE REWORK	F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%.
EXAMINATION/EVALUATION	-	-	-	39,590	-	39,590	0.1
DISASSEMBLE/ASSEMBLE	840,008	466,427	438,590	199,222	58,117	2,002,364	6.8
ELECTRICAL/ELECTRONIC	1,563,176	111,163	2,847,542	313,472	88,978	4,924,331	16.8
HYDRAULICS/PNEUMATICS	555,015	123	1,909,851	44,633	559	2,510,058	8.5
BONDING	32	<u></u>	219,942	63	601	220,638	0.8
STRIP/FINISH/PAINT	717	_	7	-	6	730	0.0
WELD	4,250	29,297	48,160	27,183	3,913	112,803	0.4
MACHINE	393,196	650,186	1,703,553	117,121	187,056	3,051,112	10.4
WIRE CUT/MANUFACTURING	45,035	408	45,419	54,703	2,595,931	2,741,496	9.3
FORGE/FOUNDRY	2	228	32	12	13,294	13,338	0.1
LAYOUT/PATTERN	23	_	_ =	3	6,601	6,627	0.0
SHEET METAL	1,195,396	101,696	484,710	121,350	208,769	2,111,921	7.2
CLEAN, ABRASIVE	5,242	5,244	14,600	2,375	4	27,465	0.1
CLEAN, CHEMICAL	-	2,372	3,305		_	5,677	0.0
HEAT TREAT	16,870	1,190,758	224,641	6,596	24	1,438,889	4.9
PLATING	-	1	216	10		226	0.0
ACKING/PRESERVATION	2,786	44	2500	294,908	149	297,887	1.0
CALIBRATION	158,463	_	950,316	464,781	1,788	1,575,348	5.4
TESTING	383,002	249,713	236,335	324,409	26,182	1,219,641	4.2
MISCELLANEOUS-	STORPANCE:	B.C3#2/47.1		STEER TOUTON	4703910000 1		1 555
ARMAMENT	289.794	46,236	299,320	6.848		642,198	2.2
BEARINGS	2			_	_	2.70	
BLADES - PROP	_	_	_		_		_
ROTOR	173,118	30,545	2.704.724	8,190	111	2,916,688	9.9
CONTROL CABLES		_	-	_	2		
EJECTION SEAT		2	_			04	
FABRIC/RUBBER/PLASTICS	606,970	115,143			_	722,113	2.5
FLIGHT CONTROLS & SUBASSM.	>7454100	, <i>M</i>		_	_		
FUEL CONTROLS & ACCESSORIES	21,554	192,866	188,727	18,147	159	421,453	1.4
GROUND SUPPORT EQUIPMENT	865,578	259,333	782,389	466,603		2,373,903	8.
LANDING GEAR	_	_	702,500		2	-	
MECHANICAL MODS. & REPAIR		2		_	= =	122	
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	-	_	-	-:	~	:=	-
CYLINDER & PISTON	-	_	_	-	-		-
PROTOTYPE	. 347	-	132	583	14,098	15,160	0,
FIELD SERVICE	2	2	-	2	4 2	12	
HELO, DYNAMIC COMPONENTS	_	2	120	40	-	-	
TOTAL	7,120,572	3,451,431	13,102,511	2,510,802	3,206,340	29,391,656	100.0
1.	24.2	11.7	44.6	8.5	10.9	100.0	1

MT PROGRAM FUNCTIONAL CATEGORY	AIRCRAFT REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC- TURING	TOTAL	%
EXAMINATION/EVALUATION	1 =	-	_	122	- = -	_
DISASSEMBLE/ASSEMBLE	1,144,152	183,263	7,424	1,603	1,336,442	6.6
ELECTRICAL/ELECTRONIC	165,258	2,600,072	356,076	29,943	3,151,349	15.6
HYDRAULICS/PNEUMATICS	283,410	2,381,568	15,713	2,338	2,683,029	13,3
BONDING	3,081	513	-	-	3,594	0.0
STRIP/FINISH/PAINT	226,119	1,108	4,756	101	232,084	1.2
WELD	52,462	12,944	962	-	66,368	0.3
MACHINE	15,993	2,497,154	33,693	38,472	2,585,312	12.8
WIRE CUT/MANUFACTURING 1	_	-	1,2	-		
FORGE/FOUNDRY	-	-		31	31	0.0
LAYOUT/PATTERN	2,376	61	24,078	1,315	27,830	0.1
SHEET METAL	607,738	175,478	191,649	32,535	1,007,400	5.0
CLEAN, ABRASIVE	-	_		-	- Table	-
CLEAN, CHEMICAL	_	_	- -0:	1	<u>24</u> 0	-
HEAT TREAT	<u>22</u> 3		<u> 20</u> 0	_		_
PLATING	_	_	_		_	_
PACKING/PRESERVATION	361	54,646	171	_	55,178	0.3
CALIBRATION	273	135,302	26,853	-	162,428	0.8
TESTING	314,728	1,699	12,433	_	328,860	1.6
MISCELLANEOUS-						
ARMAMENT	392,124	125,703	5,483	_	523,310	2.6
BEARINGS	104,890	1,130,201	2,215	673	1,237,979	6.1
BLADES - PROP	-					
ROTOR	298,395	48,707	393	1,266	348,761	1.7
CONTROL CABLES	43,214	22,476	4,454	11,489	81,633	0.4
EJECTION SEAT	_	ω.	_		_	_
FABRIC/RUBBER/PLASTICS	221,991	12,661	16,916	2,246	253,814	1.3
FLIGHT CONTROLS & SUBASSM.	_		-	_	- 0 -	-
FUEL CONTROLS & ACCESSORIES		_	<u>-</u>		-	_
GROUND SUPPORT EQUIPMENT	2,340	81,894	9,817	12	94,063	0.5
LANDING GEAR	564,387	480,221	10,984	46	1,055,638	5.2
MECHANICAL MODS. & REPAIR	-	_	-			_
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	-	-	-	-	-	-
CYLINDER & PISTON	2		_	-		-
PROTOTYPE	-	+.	. 	-	-	-
FIELD SERVICE	70	-	3,540	-	3,610	0.0
HELO. DYNAMIC COMPONENTS	369,644	4,568,805	3,983	_	4,942,432	24.5
TOTAL	4,813,006	14,514,476	731,593	122,070	20,181,145	100.0
%	23.8	71.9	3,6	0.6	100.0	

NAVAIREWORKFAC PENSACOLA DIRECT MATERIAL (DOLLARS) 1 JAN 78 – 30 JUN 78

FIGURE A-28

TOTAL DIRECT MATERIAL (DOLLARS) 1 JUL 77 – 31 DEC 77

MT PROGRAM FUNCTIONAL	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%	DRIVER RANKING
CATEGORY	13,952		787,442	265,193	173,948	314,752	1,555,287	1.4	17
EXAMINATION/EVALUATION	2,972,921	25,826	8,526,096	2,525,007	286,497	59,847	14,396,194	13.3	2
DISASSEMBLE/ASSEMBLE		190,672	305,886	13,239,184	983,243	129,387	17,458,282	16.1	1
ELECTRICAL/ELECTRONIC	2,609,910	190,072	1,738,615	9,313,739	143,097	7,453	12,615,509	11.7	3
HYDRAULICS/PNEUMATICS	1,412,605		1,730,013	509,329	2,760	1,825	609,381	0.6	24
BONDING	95,467		152,024	265,762	15,669	177,819	975,043	0.9	22
STRIP/FINISH/PAINT	363,769	-) SESSENCE	194,794	44,158	78,740	772,480	0.7	23
WELD	236,711	3/5	218,077	4,810,025	178,580	431,142	7,230,002	6.7	4
MACHINE	506,453	-	1,303,802		309,486	2,722,447	3,388,426	3.1	12
WIRE CUT/MANUFACTURING	129,689	41,816	51,897	133,091	517	16,651	47,544	0.0	33
FORGE/FOUNDRY	2,232	-	10,734	17,410	24,396	14,256	60,160	0.1	32
LAYOUT/PATTERN	8,684	-	459	12,365		426,703	6,717,342	6.2	5
SHEET METAL	2,968,973	-	497,592	2,012,569	811,505 2,774	168	430,896	0.4	26
CLEAN, ABRASIVE	9,882	-	144,433	273,639	25.5382.0	14,294	512,280	0.5	25
CLEAN, CHEMICAL	40,011	-	151,257	245,256	61,462	14,294	1,468,577	1.4	18
HEAT TREAT	17,503	-	1,190,767	253,631	6,596		318,365	0.3	27
PLATING	18,424	968	99,146	187,959	6,775	5,093	1,409,004	1.3	19
PACKING/PRESERVATION	4,411	=	208,978	696,161	469,742	29,712	2,502,414	2.3	14
CALIBRATION	160,580	146	2,210	1,533,743	803,737	1,998		3.4	10
TESTING	1,088,148	53,844	1,286,449	764,859	431,553	30,552	3,655,405	3.4	
MISCELLANEOUS-					- FANTANCE		4,112,349	3.8	8
ARMAMENT	766,948	1,342,924	48,248	1,597,553	341,770	14,906	2,465,536	2.3	15
BEARINGS	154,714	70	625,235	1,673,921	6,961	4,705		0.3	28
BLADES - PROP	25,362	24	11,952	253,806	-	-	291,120		9
ROTOR	474,424	1-1	30,545	3,427,988	8,583	1,377	3,942,917	3.7	31
	43,219	-	-	22,673	4,493	11,564	81,949	0.1	5.0
CONTROL CABLES	79,457	_	-	52,139	49,711	28,450	209,757	0.2	29
EJECTION SEAT	991,244	_	125,928	185,573	27,226	27,263	1,357,234	1.3	20
FABRIC/RUBBER/PLASTICS	123,159		t=	23,233	2,381	-	148,773	0.1	30
FLIGHT CONTROLS & SUBASSM.	100000000000	-	1,735,055	1,218,686	247,914	161	3,414,732	3.2	11
FUEL CONTROLS & ACCESSORIES	886,632	_	259,403	1,708,396	531,514	12	3,385,957	3.1	13
GROUND SUPPORT EQUIPMENT	1,048,432		_	1,101,952	18,654	405	2,169,443	2.0	16
LANDING GEAR	1,040,452		_	: -	-	2	-		
MECHANICAL MODS. & REPAIR	200 m		3,247,192	891,603	39,567	_ =	4,178,362	3.9	7
COMPRESSOR/TURBINE/ENGINE METAL REPAIR				400000000000000000000000000000000000000	HIPWY-DOLD.		1,026,732	1.0	21
CYLINDER & PISTON	2	-	730,047	296,685	-	-	15,160	0.0	34
PROTOTYPE	347) ;	(7)	132	583	14,098	WARTING .	850	35
FOR WANTER STREET	70		-	-	3,540	72.	3,610	0.0	3:
FIELD SERVICE	369,644		-	4,568,805	3,983	-	4,942,432	4.6	'
HELO. DYNAMIC COMPONENTS	17,836,893	1,656,196	23,489,469	54,276,861	6,043,375	4,565,860	107,868,654	100.0	17
TOTAL	16.5	1.5	21.8	50.3	5.6	4.2	100.0	-	

FIGURE A-29

GRAND TOTAL DIRECT LABOR AND DIRECT MATERIAL (DOLLARS) 1 JUL 77 – 31 DEC 77

MT PROGRAM FUNCTIONAL	ALAMEDA	CHERRY	JACKSON VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%	COST DRIVER RANKING
CATEGORY		867,528	118,914	1,575,297	822,254	452,925	5,546,804	2.5	11
XAMINATION/EVALUATION	1,709,886	Descendant (DA)	2,488,017	8,868,349	7,440,693	3,571,538	32,895,875	15.0	2
DISASSEMBLE/ASSEMBLE	3,/39,894	6,787,384	5,380,945	- Amerikana	9,800,506	7,968,395	39,596,712	18.1	1
ELECTRICAL/ELECTRONIC	5,498,191	4,047,686	1,221,403	6,900,989	2,972,355	3,491,566	17,846,800	8.2	4
HYDRAULICS/PNEUMATICS	6,221,117	2,178,360	1,221,400	1,761,999	394,874	197,752	1,502,139	0.7	26
BONDING	487,328	422,185	25.0.022			1,038,446	5,428,261	2.5	12
STRIP/FINISH/PAINT	794,445	1,004,885	756,822	766,684	1,066,977	150,577	1,779,622	0.8	23
WELD	328,073	332,356	243,516	440,828	284,272	3,762,331	13,928,885	6.4	5
MACHINE	1,251,147	1,649,367	785,242	1,725,003	4,755,795	3,762,331	4,775,876	2.7	15
WIRE CUT/MANUFACTURING	251	152,256	134,810	896,405	3,592,154		281,425	0.1	33
FORGE/FOUNDRY	80,761	68,852	16,411	- 23	52,384	62,017		0.3	30
LAYOUT/PATTERN	80,762	35,490	-	185,326	78,797	187,490	567,874	10.1	3
SHEET METAL	2,945,536	2,702,843	1,782,096	4,850,964	5,740,954	4,017,469	22,039,862	0.8	24
CLEAN, ABRASIVE	187,063	534,957	237,529	393,031	134,841	165,820	1,653,241	73378	22
CLEAN, CHEMICAL	188,089	717,137	(4)	408,483	108,557	501,329	1,923,595	0 9	21
Receipt Modern Colors Color Colors	76,369	_	20,888	12	1,745,293	84,209	1,926,759	0.9	
HEAT TREAT	116,367	382,007	255,393	405,975	175,49#	243,972	1,579,213	0.7	25
PLATING	839,979	705,631	535,656	330,299	595,50?	490,497	3,497,564	1.6	17
PACKING/PRESERVATION	2000000000	242,102	642,776	649,197	2,763,799	494,029	5,917,326	2.7	9
CALIBRATION	1,125,423	1,424,672	865,587	1,653,334	3,909,482	1,252,726	11,325,475	5.2	6
TESTING	2,219,674	1,424,072		1,000,001	a) = 1				
MISCELLANEOUS-			847,795	2,593,864	803,525	811,674	6,476,314	3.0	1
ARMAMENT	1,194,757	224,699	358,860	2,593,664	226,670	1,452,113	3,286,586	1.5	18
BEARINGS	965,601	283,342	97,817	-	_		808,919	0.4	28
BLADES - PROP			37,017	711,102	3,351,656	459,673	4,909,075	2.2	13
ROTOR	S= 1	1,097,746		-		138,408	143,520	0.1	34
CONTROL CABLES	1.00	=	5,112		-	130,400	435,583	0.2	32
EJECTION SEAT	-	=	38,109	397,474	-	453.075	2,438,461	1.1	20
FABRIC/RUBBER/PLASTICS	275,452	375,903	233,766	184,688	916,577	452,075	541,921	0.2	31
FLIGHT CONTROLS & SUBASSM.	-	-	541,921	-		N-	The state of the s	2.2	14
FUEL CONTROLS & ACCESSORIES	-		1,428,675	2,874,981	518,035	950	4,821,691	2.7	8
GROUND SUPPORT EQUIPMENT	1,147,723	162,376	349,624	521,437	3,580,813	159,041	5,921,014		19
	558,486	234,482	379,584	345,495	-	1,274,018	2,792,065	1.3	100
LANDING GEAR	_		76,480	-	-	-	76,480	0.0	36
MECHANICAL MODS. & REPAIR		12-1	4,390,047	2	-		4,390,047	2.0	16
COMPRESSOR/TURBINE/ENGINE METAL REPAIR			1,111,132	_		9	1,111,132	0.5	27
CYLINDER & PISTON	-		1,111,132		79,740	2	79,740	0.0	35
PROTOTYPE	+	. 55	-	275 656		261,754	637,410	0.3	29
FIELD SERVICE	-	1.71	-	375,656	A ST	5,719,835	5,719,835	2.6	10
HELO. DYNAMIC COMPONENTS			\$41 1500000000000	200000000000000000000000000000000000000		38,862,690	218,603,101	100.0	
TOTAL	32,032,374	26,634,246	25,344,927	39,816,860	55,912,004	17.8	100.0	est ness.	4
"	14.7	12.2	11.6	18.2	25.6	17.8	100.0		

GRAND TOTAL DIRECT LABOR AND DIRECT MATERIAL (DOLLARS) 1 JUL 77 – 31 DEC 77

PROGRAM PROGRAM	AIRCRAFT REWORK	MISSILE REWORK	ENGINE REWORK	COMPONENT F/E MATERIAL	OTHER SUPPORT	MANUFAC TURING	TOTAL	%.	COST DRIVER RANKING
CATEGORY	2 122 005	20.022	1,452,942	1,027,626	553,460	339,769	5,546,804	2.5	11
XAMINATION/EVALUATION	2,133,985	39,022	12,082,900	3,438,809	1,127,877	86,736	32,895,875	15.0	2
DISASSEMBLE/ASSEMBLE	15,926,354	233,199		25,172,702	2,656,192	290,734	39,596,712	18.1	1
LECTRICAL/ELECTRONIC	10,348,709	313,526	814,849	12,856,732	317,581	15,122	17,846,800	8.2	4
TYDRAULICS/PNEUMATICS	2,185,185		2,472,180	972,206	23,621	14,985	1,502,139	0.7	26
BONDING	489,568	194	1,565	NAME OF THE PARTY	314,183	337,062	5,428,261	2.5	12
TRIP/FINISH/PAINT	3,473,190	28,631	315,617	959,578	144,169	* No. Art 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1.	1,779.622	0.8	23
VELD	406,124	184	554,816	473,921	AN 100 METERS	200,408	13,928,885	6.4	5
MACHINE	1,707,209	2,322	2,847,507	6,792,035	764,395	1,815,417	4,775,876	2.2	15
VIRE CUT/MANUFACTURING	330,593	53,200	66,198	377,461	396,050	3,552,374		0.1	33
ORGE/FOUNDRY	22,785	75	17,690	37,058	46,679	157,138	281,425	0.3	30
_AYOUT/PATTERN	52,947	76	681	24,859	172,153	317,158	567,874		3
SHEET METAL	14,157,239	393	737,254	3,445,152	2,666,487	1,033,337	22,039,862	10.1	24
CLEAN, ABRASIVE	325,314	6,918	424,329	819,726	59,826	17,128	1,653,241	0.8	22
CLEAN, CHEMICAL	958,433	12,156	309,878	500,888	121,281	20,959	1,923,595	0.9	VARA-9
HEAT TREAT	52,707	-	1,274,597	493,755	26,023	79,677	1,926,759	0.9	21
PLATING	223,045	10,309	350,080	851,422	70,058	74,299	1,579,213	0.7	25
ACKING/PRESERVATION	220,639	19	323,959	1,448,581	1,445,029	59,337	3,497,564	1,6	17
	258,493	257	2,338	2,916,721	2,737,076	2,441	5,917,326	2.7	9
CALIBRATION	5,871,668	769,956	1,997,177	1,525,349	1,102,037	59,288	11,325,475	5.2	6
TESTING	5,511,555	7,03,555							
MISCELLANEOUS-	1,524,411	1,813,123	86,492	2,488,909	538,781	24,598	6,476,314	3.0	7
ARMAMENT	198,771	1,613,123	707,632	2,094,937	53,459	231,787	3,286,586	1.5	18
BEARINGS	0.000011000		231,816	487,994	49,265	-	808,919	0.4	28
BLADES - PROP	39,843	1	31,353	4,248,925	21,238	5,876	4,909,075	2.2	13
ROTOR	601,683		31,353	39,207	10,641	23,751	143,520	0.1	34
CONTROL CABLES	69,921	_		155,859	80,394	30,525	435,583	0.2	32
EJECTION SEAT	159,776	-	9,029	372,154	100,624	118,453	2,438,461	1.1	20
FABRIC/RUBBER/PLASTICS	1,710,644	-	136,586	6700000000	12,472	110,000	541,921	0.2	31
FLIGHT CONTROLS & SUBASSM.	500,803		28	28,618	350,588	3,606	4,821,691 •	2.2	14
FUEL CONTROLS & ACCESSORIES	630,513	-	2,160,102	1,676,882	1,070,817	200,769	5,921,014	2.7	8
GROUND SUPPORT EQUIPMENT	1,210,832		259,625	3,178,971	47,686	6,045	2,792,065	1.3	19
LANDING GEAR	1,323,082	=	4,359	1,410,893	200-200	6,043	76,480	0.0	36
MECHANICAL MODS. & REPAIR	416	2	104	9 973	76,064		4,390,047	2.0	16
COMPRESSOR/TURBINE/ENGINE METAL REPAIR	152	-	3,413,584	933,490	42,821	_		0.5	27
CYLINDER & PISTON		=	783,596	326,014	1,522	14	1,111,132	75-7620	35
PROTOTYPE	4,221	347	24	1,557	15,529	58,409	79,740	0.0	25
	5,044	99 (Hr)	306	158,650	440,354	33,056	637,410	0.3	
FIELD SERVICE	388,167			5,298,494	33,174	-	5,719,835	2.6	10
HELO, DYNAMIC COMPONENTS	67,512,466	3,283,561	33,871,089	87,036,135	17,689,606	9,210,244	218,603,101	100.0	-
TOTAL	30.9	1.5	15.5	39.8	8.1	4.2	100.0	-	

N/C MACHINE UTILIZATION NAVAIREWORKFAC ALAMEDA 1 JUL 77 – 31 DEC 77

MACHINE/	N/C			PROD	UCTION 1	TIME (HO	URS)					CUT	TING TIN	ME (HOUR			
PROCESS	MACHINE	JUL	AUG	SEP	ОСТ	NOV	DEC	TOTAL	%	JUL	AUG	SEP	ОСТ	NOV	DEC	TOTAL	%
	CINCINNATI LATHE I	57.2	38.0	55.3	0.0	0.0	86.8	237.3	2.6	47.0	30.5	49.3	0.0	0.0	67.3	194.1	3
	BULLARD VTL						45.5	45.5	0.5						42.5	42.5	0
	WADELL TURRET LATHE I	35.9	103.0	113.0	95.0	36.8	7.6	391.3	4.2	20.9	93.5	75.1	46.5	23.9	6.9	266.8	4
LATHES	WADELL TURRET LATHE II	18.0	95.7	124.0	96.5	246.0	137.1	717.3	7.8	7.0	76.0	110.2	83.5	235.0	119.6	631.3	9
	CINCINNATI LATHE II	55.7	138.8	76.9	117.6	162.3	100.7	652.0	7.1	48.1	114.7	67.3	104.2	127.4	23.7	485.4	7
	JONES & LAMSON PRODUCTION CENTER	27.8	37.1	62.1	68.0	71.0	107.4	373.4	4.0	13.3	36.0	14.5	63.7	52.5	103.1	283.1	4
	WARNER & SWASEY TURRET	273.4	301.6	21.5	173.0	267.4	100.0	1,136.9	12.3	217.3	289.1	19.5	125.6	217.1	63.8	932.4	14
	TAPE-O-MATIC DRILL	46.2	84.0	32.0	3.5	128.0	19.0	312.7	3.4	37.5	74.0	31.5	3.5	50.6	17.2	214.3	-
DRILLS	BURGMASTER DRILL 3000	94.6	108.6	122.6	48.7	118.1	98.9 .	591.5	6.4	68.8	42.3	43.2	36.5	82.3	43.9	317.0	Ľ
	BURGMASTER DRILL 6000	9			0.0		45.5	45.5	0.5				0.0		38.5	38.5	
PUNCH	STRIP PIT FABRAMATIC PUNCH		56.0	96.0	0.0		34.3	186.3	2.0		56.0	96.0	0.0		16.0	168.0	
WWW	MONARCH EDLUND MILL	0.0	36.3	0.0	24.0	37.4	33.0	130.7	1.4	0.0	26.2	0.0	19.2	28.0	1.0	74.4	
	BRIDGEPORT MILL I	180.5	237.0	141.0	150.0	234.5	129.1	1,072.1	11.6	105.5	134.5	77.5	91.0	118.5	59.0	586.0	9
	BRIDGEPORT MILL II	203.7	174.9	109.5	62.0	88.0	13.0	651.1	7.1	148.3	86.3	58.5	58.5	69.5	0.0	421.1	
MILLS/BORING MILL	SUNDSTRAND MILL 4-AXIS I	129.8	284.7	79.1	38.6	59.7	19.2	611.1	6.6	55.3	248.7	62.1	11.5	14.0	0.0	391.6	
	SUNDSTRAND MILL 4-AXIS II	68.4	0.0	31.4	22.7	113.5	22.0	258.0	2.8	40.8	0.0	22.1	16.6	109.5	21.0	210.0	į.
	SUNDSTRAND MILL 4-AXIS III	0.0	75.7	192.2	158.8	186.1	8.0	620.8	6.7	0.0	7.5	117.1	152.7	180.2	0.0	457.5	
	KEARNEY-TRECKER MODEL II 4-AXIS	263.2	129.2	3.5	76.6	124.5	100.1	697.1	7.6	190.8	99.7	3.5	23.8	53.1	48.6	419.5	
MACHINING CENTERS	KEARNEY-TRECKER MODEL II 4-AXIS				39.0	16.0	0.0	55.0	0.6				26.3	13.8	0.0	40.1	
	KEARNEY-TRECKER MODULINE (5-AXIS)	0.0	53.5	28.4	20.9	51.7	67.6	222.1	2.4	0.0	49.1	23.7	2.0	36.2	34.4	145.4	
GRINDER	ELECTRODYNE GRINDER				0.0			0.0	0.0				0.0			0.0	_
ROUTER	N/C ROUTER		107.5	73.0	0.0		42.5	223.0	2.4		84.0	63.0	0.0		23.5	170.5	-
	TOTAL	1,454.4	2,061.6	1,361.5	1,194.9	1,941.0	1,217.3	9,230.7	100.0	1,000.6	1,548.1	934.1	865.1	1,411.6	730.0	6,489.5	10

N/C MACHINE UTILIZATION NAVAIREWORKFAC CHERRY POINT 1 JUL 77 – 31 DEC 77

	MACHINE/				PROD	UCTION .	TIME (HO	URS)					CUT	TING TIN	1E (HOUR	S)		
	PROCESS	N/C MACHINE	JUL	AUG	SEP	ОСТ	NOV	DEC	TOTAL	%	JUL	AUG	SEP	ост	NOV	DEC	TOTAL	%
	LATHES	CINCINNATI TURNING CENTER	116.0	106.0	38.0	142.0	128.0	67.0	597.0	8.9	112.5	99.5	38.0	139.0	123.0	45.5	557.5	9.7
		WADELL TURRET LATHE	20.5	192.0	47.0	48.0	106.0	48.0	461.5	6.8	6.5	160.5	47.0	45.0	72.5	43.5	375.0	6.5
	PUNCH	STRIPPIT PUNCH	39.0	66.0	79.0	23.0	47.0	12.0	266.0	3.9	31.0	43.0	51.0	14.0	29.0	8.0	176.0	3.1
		GORTON MILL	0.0	123.5	130.5	76.0	112.0	133.0	575.0	8,5	0.0	83.5	97.0	52.0	80.0	91.5	404.0	7,0
Ž.	MILLS/BORING MILL	PRATT WHITNEY JIG BORE II	88.0	40.0	120.0	40.0	64.0	80.0	432.0	6.4	88.0	40.0	120.0	40.0	64.0	72.0	424.0	7.4
		BRIDGEPORT MILL	114.0	202.5	147.5	138.0	139.0	32.0	773.0	11.5	102.5	180.5	145.5	138.0	117.5	32.0	716.0	12.4
		K-T MOD II MACHINING CENTER II	78.5	80.0	112.0	119.0	217.5	193.5	800.5	11.9	78.5	80.0	112.0	119.0	190.5	188.0	768.0	13.3
		OMI OMNIMILL 258	63.0	225.0	59.0	137.5	90.0	96.0	670.5	9.9	57.0	217.5	59.0	137.5	45.0	74.0	590.0	10.3
	MACHINING CENTERS	OMI OMNIMILL 268	110.0	4.0	20.0	0.0	16.0	0.0	150.0	2.2	110.0	4.0	16.0	0.0	16.0	0.0	146.0	2.5
	CENTENS	2010 AMERICAN HUSTLER	117.5	163.7	191.5	172.0	296.5	231.0	1,172.2	17.4	99.0	147.6	162.5	135.1	295.0	221.4	1,060.6	18.4
		MONARCH VMC 200	154,0	79.0	116.0	109.5	164.0	56.0	678.5	10.1	94.5	52.0	64.5	70.0	101.0	24.0	406.0	7,1
		MONARCH TC1	-	-	-	-	-	168.0	168.0	2.5	-	-	-	-	-	130 5	130.5	2.3
		TOTAL	900.5	1,281.7	1,060.5	1,005.0	1,380.0	1,116.5	6,744.2	100.0	779.5	1,108.1	912.5	889.6	1,133.5	930.4	5,753.6	100.0

N/C MACHINE UTILIZATION NAVAIREWORKFAC JACKSONVILLE 1 JUL 77 – 31 DEC 77

MACHINE/	CODE			PROD	UCTION '	TIME (HO	URS)					CUT	TING TIN	ME (HOUR	S)		
PROCESS	N/C MACHINE	JUL	AUG	SEP	ОСТ	NOV	DEC	TOTAL	%	JUL	AUG	SEP	ОСТ	NOV	DEC	TOTAL	%
	BULLARD VTL 09 DYN-AU-TROL	0.0	-			-	84	12	~	0.0	2	-	_	-	40	- 4	_
LATHES	CINCINNATI TURNING 17 CENTER	63.5	65.0	0.0	0.0	66.0	4.0	198.5	3.2	57.5	33.0	0.0	0.0	64.0	0.0	154.5	3.5
	WADELL LATHE 18	76.0	130.5	231.5	153.0	144.0	140.0	875.0	13.9	40.0	111.5	164.0	91.0	47.3	102.0	555.8	12.8
DBILLS	PRATT-WHITNEY 2 AX DRILL MOD C	30.0	24.0	32.0	56.0	64.0	96.0	302.0	4.8	9.0	0.0	8.0	12.0	0.0	0.0	29.0	0.7
DRILLS	BURGMASTER DRILL 35 8 SPINDLE	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MILLS/BORING	BRIDGEPORT PROFILER 51	142.0	212.0	188.0	107.5	195.0	145.5	990.0	15.7	108,5	171.5	132.5	63.0	113,0	54.0	642.5	14.8
MILL	LUCAS HORZ BORE-DRILL 57	35.5	37.4	98.0	25.0	64.0	16.0	275.9	4.4	8.0	0.0	9.0	0.0	8.0	0.0	25.0	0.6
	K-T MOD II MACHINING 52 CENTER 1	16.0	168.0	24.5	47.0	58.0	0.0	313.5	5.0	14.0	152.5	18.0	43.0	48.5	0.0	276.0	6.3
	K-T MOD II MACHINING 53 CENTER 2	0.0	164.0	69.0	124.5	67.5	44.0	469.0	7.4	0.0	149.0	53.5	107.5	57.0	34.5	401.5	9.2
MACHINING CENTERS	GIDDINGS-LEWIS 2 AXIS 54 MILL	333.5	158.0	71.6	66.5	8.0	61.0	698.6	11.1	284.5	156.0	38.1	39.5	8.0	29.5	555.6	12.8
	SUNDSTRAND 4-AX OMI-1	0.0	0.0	24.0	192.0	109.5	104.0	429.5	6.8	0.0	0.0	24.0	176.5	103.0	91.5	395.0	9.1
	SUNDSTRAND 4-AXIS OMI-2	235.0	245.0	166.0	4.0	13.5	147.0	810.5	12.9	225,5	239.5	139.0	4.0	7.5	113.0	728.5	16.7
	KEARNEY-TRECKER 56 5 AXIS MILL	200.5	199.5	101.0	179.7	149.5	104.0	934.2	14.8	142.5	107.5	61.5	154.0	85.0	41.0	591,5	13.6
	TOTAL	1,132.0	1,403.4	1,005.6	955.2	939.0	861.5	6,296.7	100.0	889.5	1,120.5	647.6	690.5	541.3	465.5	4,354.9	100.1

DATA SOURCE: N/C MACHINE UTILIZATION REPORT

N/C MACHINE UTILIZATION NAVAIREWORKFAC NORFOLK 1 JUL 77 – 31 DEC 77

MACHINE/	N/C			PROD	UCTION	TIME (HO	URS)					CU.	TTING TI	NE (HOUF	RS)		
PROCESS	MACHINE	JUL	AUG	SEP	ост	NOV	DEC	TOTAL	%	JUL	AUG	SEP	ост	NOV	DEC	TOTAL	%
	CINCINNATI TURNING CENTER	104.0	142.4	98.0	80.0	66.5	167.0	657.9	4.9	67.0	126.8	85.5	66.6	65.0	153.0	563.9	5
LATHES	WADELL TURRET LATHE	211.8	243.4	209.0	231.9	152.9	218.1	1,267.1	9.4	138.1	181.0	140.3	183.4	115.5	186.0	944.3	8
	AMERICAN 4 AXIS TURNING CENTER	93.9	24.0	36.8	13.0	52.5	79.6	299.8	2.2	76.1	18.6	25.6	11.3	33.1	69.2	233.9	2
	WARNER-SWASEY 1-SC LATHE	55.5	152,5	154.0	139.6	151.8	159.0	812.4	6.0	29.6	104.8	111.0	109.9	108.4	100.6	564.3	5
DRILLS	BURGMASTER DRILL 6 SPINDLE	128.7	51.9	147.0	138.7	118.3	151.1	735.7	5.5	115.8	37.7	109.4	95.0	93.2	117.4	568.5	5
DRILLS	BURGMASTER DRILL 8 SPINDLE	126.0	171.2	167.5	149.2	147.6	136.3	897.8	6.7	108.6	149.9	127.3	120.6	118.1	113.1	737.6	7
MILLS/DODING	RRIDGEPORT MILL	53.5	116.2	110.5	102.8	120.0	123.5	626.5	4.7	45.6	99.6	86.1	78.2	107.3	102.6	519.4	4
MILLS/BORING MILL	LÉBLOND FOSMATIC JIG BORER	18.0	69.5	0.0	ins.	-	=	87.5	0.6	13.5	62.0	0.0	7:	-	- 1	75.5	(
	K-T MODEL II MACHIN- ING CENTER II	40.5	92.0	33.0	45.5	NA	NA	211.0	1.6	37.0	85.5	27.5	25.4	NA	NA	175.4	
	SUNDSTRAND OM3 MACHINING CENTER	77.2	293.0	150,5	315.5	384 5	459.5	1,680.2	12.5	31.4	191.5	128.0	277.1	284.3	411.1	1,323.4	12
	DEVLIEG MACHINING CENTER I	10.0	0.0	120.5	148.5	229,5	147.3	655.8	4.9	6.2	0.0	70.2	131.3	204.7	123.9	536.3	9
MACHINING	DEVLIEG MACHINING CENTER II	161.0	246.5	277.4	172.5	259.6	210,5	1,327.5	9.9	81.2	165.4	246.7	163.0	250 1	172.7	1,079.1	10
CENTERS	GIDDINGS/LEWIS 5V MACHINING CENTER	119.5	104.0	101.5	188.9	132.7	92.8	739.4	5.5	75.1	66.7	74.3	165.0	109.1	64.6	554.8	
	SUNDSTRAND OMI MACHINING CENTER I	52.8	180.7	150.7	26.2	12.0	168.0	590.4	4.4	25.6	163.8	117.6	8.5	11.5	139.0	466.0	29
	SUNDSTRAND OMI MACHINING CENTER II	160.3	37.5	93.4	149.5	208.1	188.4	837.2	6.2	130.7	34.5	76.8	125.7	167.8	123.6	659.1	5
	SUNSTRAND OMI MACHINING CENTER III	134.5	175.1	126.1	193.0	186.3	192.2	1,007.2	7.5	88.4	155.5	91.4	164.5	160.6	161.1	821.5	
1	SUNSTRAND OMI MACHINING CENTER IV	98.7	123.8	149.1	181.3	214.2	183.9	951.0	7.1	78.2	96.4	122.5	150,1	146 6	125.7	719.5	1
TUBE BENDER	VECTORBEND	- 0-	-		11.9	65.6		77.5	0.6	*		(4)	0.0	16.8		16 8	2
	TOTAL	1,645.9	2,223.7	2,125.0	2,288.0	2,502.1	2,677.2	13,461.9	100.0	1,148.1	1,739.7	1,640.2	1,875.6	1,992.1	2,163.6	10,559.3	10

N/C MACHINE UTILIZATION NAVAIREWORKFAC NORTH ISLAND 1 JUL 77 – 31 DEC 77

MACHINE/				PROD	UCTION	TIME (HO	URS)					С	UTTING 1	TIME (HO	URS)	***************************************	
PROCESS	N/C MACHINE	JUL	AUG	SEP	ОСТ	NOV	DEC	TOTAL	%	JUL	AUG	SEP	ост	NOV	DEC	TOTAL	%
	CINCINNATI TURNING CENTER	44.2	16.7	0.0	0.0	0.0	0.0	60.9	0.4	39.7	14.2	0.0	0.0	0 0	0.0	53.9	0 4
	WADELL TURRET LATHE DNC	209.0	112.0	104.0	171.0	69.0	138.0	803.0	4.7	123.0	87.0	84.0	136.0	60.0	118.0	608.0	42
LATHES	JONES & LAMSON PRODUCTION CENTER	182.5	319.8	280.7	128.5	153.1	202.0	1,266.6	7.4	118.6	208.7	155.7	76.0	86.1	102.0	747.1	5.2
	JONES & LAMSON 1508-A CHUCKER 1	0.0	0.0	0.0	0.0	121.0	44.0	165.0	1.0	0.0	0.0	0.0	0.0	88.5	31.5	120.0	0 8
	JONES & LAMSON 1508-A CHUCKER 2	0.0	0.0	0.0	0.0	321.5	173.7	495.2	2.9	0.0	0.0	0.0	0.0	175.5	83.7	259.2	1.8
DRILL	PRATT & WHITNEY DRILL MODEL C	184.0	184.0	168.0	159.0	168.0	192.0	1,055.0	6.2	184.0	184.0	168.0	159 0	168.0	192.0	1,055.0	7.4
	WHITNEY PUNCH PRESS	21.0	44.0	89.0	28.0	52.0	53.0	287.0	1.7	21.0	39.5	87.0	26.5	52.0	53.0	279.0	1.9
PUNCHES	STRIPPIT PUNCH PRESS	36.0	87.0	32.5	45.0	41.5	118.0	360.0	2.1	36.0	79.0	17.0	30.0	21.5	88.0	271.5	1.9
	LUCAS JIG MILL 4418120	335.2	296.0	272.0	316.0	372.0	368.0	1,959.2	11.4	335.2	296.0	272.0	316.0	372.0	368.0	1,959.2	13.7
MILLS/BORING	LUCAS JIG MILL 41872	143.5	119.5	159.0	164.5	131.0	98.1	815.6	4.8	119.5	114.0	140.5	143.0	121.0	93.5	731.5	5.1
MILL	FOSMATIC JIG BORE	157.0	228.5	273.0	286.0	274.0	252.5	1,471.0	8.6	157.0	202.5	273.0	283.0	268.0	252.5	1,436.0	10.0
	SUNDSTRAND OM1 MACH. CTR. 1	0.0	0.0	8.0	75.0	170.5	49.5	303.0	1.8	0.0	0.0	8.0	72.5	159.5	49 5	289.5	2.0
	SUNDSTRAND OM1 MACH. CTR. 2	156.0	134.5	80.5	186.0	152.0	147.5	856.5	5.0	116.5	132.0	80.5	141.0	124.5	91.0	685.5	4.8
	SUNDSTRAND OM1 MACH. CTR. 3	0.0	90.0	269.3	167.5	161.0	139.5	827.3	4.8	0.0	81.0	269.3	110.5	85.0	101.0	646.8	4.5
MACHINING CENTERS	SUNDSTRAND OM1 MACH. CTR. 4	283.7	164.5	68.5	0.0	0.0	0.0	516.7	3.0	224.5	117.5	68.5	0.0	0.0	0.0	410.5	2.9
CENTERS	SUNSTRAND OM3 MACH, CTR. 1	221.0	139.5	196.0	194.7	144.0	35.0	930.2	5.4	221.0	128.5	196 0	189.7	131.5	26.0	892 7	6.2
	SUNDSTRAND OM3 MACH. CTR. 2	227.0	180.0	50.5	178.8	116.5	109.5	872.3	5.1	119.8	119.5	60.5	145.3	75.0	62.5	582.6	4 1
	BRIDGEPORT MACH. CTR.	89.0	82.5	128.0	65.5	103.0	46.5	514.5	3.0	87.6	70.6	107.2	48.0	98.5	31.6	443.5	3.1
	MONARCH VMC 200 MACH. CTR.	192.8	210.0	133.5	132.0	267.0	191.5	1,126.8	6.6	152.3	155.0	133.5	100.0	185.0	49.5	775.3	5.4
	BROWN & SHARPE MACH. CTR.	91.2	39.5	5.0	16.5	0.0	103.7	255.9	1.5	71.7	26.4	2.7	12.5	0.0	86.2	199.5	14
	KEARNEY TRECKER MOD II MACH. CTR.	236.0	159.0	131.5	120.0	95.0	41.5	783.0	4.6	209.0	137.5	131.5	109.0	90.5	36.5	714.0	5.0
GRINDER	INGERSOL CUTTER GRINDER	90.5	144.0	119.0	123.0	118.5	96.0	691.0	4.0	50.0	100.0	77.0	78.0	79.0	62.0	446 0	3 1
ROUTER	EKSTROM CARLSON ENGRAVER ROUTER	101.0	152.0	121.0	120.0	68.0	156.0	718.0	4.2	101.0	152.0	121.0	112.0	68.0	156.0	710.0	5.0
	TOTAL	3,000.6	2,903.0	2,699.0	2,677.0	3,098.6	2,755.5	17,133.7	100.0	2,487.4	2,444.9	2,452.9	2,288.0	2,509.1	2,134 0	14,316.3	100.0

4 L

N/C MACHINE UTILIZATION NAVAIREWORKFAC PENSACOLA 1 JUL 77 — 31 DEC 77

				PROD	LICTION '	TIME (HOU	URS)					CUTT	TING TIME	-		TTOTAL	1 %
MACHINE/	J.		AUG	SEP	OCT	Nov		TOTAL	%	JUL	AUG	SEP	ост	NOV	DEC	TOTAL	70
PROCESS	N/C MACHINE	JUL		200	1 25.02.00		41.5	437.0	4.0	69.0	14.0	8.0	111.0	75.0	23.0	300.0	3.7
	JONES & LAMSON 4-AXIS LATHE	89.0	18.0	8.0	138.0	142.5	i i ewen		6.0	31.0	80.0	118.0	129.0	156.5	7.0	521.5	6.4
F	WADELL 2-AXIS LATHE	31.0	108.0	164.0	176.0	166.0	8.0	653.0			24.5	149.0	148.2	140.0	111.2	703.1	8.7
LATHES	WARNER & SWASEY MOD 1 AB LATHE	156.5	34.5	160.0	182.0	160.0	111.7	804.7	7.3	130.2	111.3	135.0	148.0	142.0	159.5	749.8	9.3
}	WARNER & SWASEY MOD 0	65.0	124.0	173.0	148.0	142.0	160.0	812.0	7.4	54.0	515,13.55			48.0	133.0	387.0	4.8
	AB LATHE TAPE-O-MATIC DRILL	77.5	60.0	49.0	36.0	48.0	133.0	403.5	3.7	70.0	51.0	49.0	36.0		32.0		4.2
)		0.0	0.0	32.0	73.0	206.0	32.0	343.0	3.1	0.0	0.0	32.0	73.0		1000000		-
DRILLS	TAPE O-MATIC DRILL	0.0	0.0	0.0	4.0	6.0	0.0	10.0	0.1	0.0	0.0	0.0	4.0		0.0		
S DRILLS	NUMERIMITE DRILL		136.5	62.0	112.0	69.0	90.0	611.5	5.6	71.0	87.5	37.0	73.0		54.0	No.	
	ROUTER/DRILL 2-AXIS	142.0	OTHER DE	82.5	88.0		34.0	417.2	3.8	84.0	72.2	54.0	59.5	4.0	28.0	Victoria	
PUNCH	FABRAMATIC 2-AXIS	98.5	98.2	1 2000			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		3.2	103.7	82.5	82.5	5.8	0.0	17.0	291.5	
MILLS/BORING	BRIDGEPORT PROFILER	109.7	100.0	83.5	19.8			2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	2.6		8.0	32.9	86.9	35.3	67.0	0 230.1	2.
MILL	3-AXIS JIG BORER	0.0	23.0	57.3				a Programme	13.0	- 100		162.5	232.5	117.5	106.5	5 1,408.5	17
	KEARNEY & TRECKER MOD II MACHINING CENTER	234.2	559.0	165.5	235.0		340 200) 15.7	34.5	5 493.2	2 6
	KEARNEY & TRECKER MOD	178.0	100.2	72.1	156.7	18.2			5.3	7.7					126.5	5 827.7	7 10
	5-AXIS OM-3 MACHINING	258.3	87.2	312.0	259.0	158.0	171.8	1,246.3	11.4					7			0 !
MACHINING CENTERS	CENTER KEARNEY & TRECKER TURN-12 MACHINING	73.0	149.5	96.0	72.0	60.0	44.0	0 494.5	4.5	51.0	139.5	94.0	34.5				
	CENTER		60.0	22.3	0.0	37.5	12.0	0 298.0	2.7	67.0	0 12.0	8.3	3 0.0	0 10.5	5 12.0	.0 109.8	8
	4-AXIS OM-1 MACHINING CENTER	157.2	69.0						6.4	1 0.0	0 5.5	5 29.5	5 107.0	0 47.0	0 97.0	.0 286.0	.0
	4-AXIS OM-1 MACHINING CENTER	8.0	63.0	171.1	179.0	0 141.0								.7 55.5	5 49.5	0.5 342.5	5
	MONARCH VMC-75	138.0	223.5	194.3	3 171.7	7 173.1	1 149.0	0 1,049.6								V.002	3
DENDER		0.0	0 16.5	6.0	5.5	5 5.3	0.0	.0 33.3	0.3	3 0.0	0 8.0	0 3.0	3.0				+
TUBE BENDER	TOTAL	1,815.9	000 00000000000000000000000000000000000	1 1,910.6	6 2,150.2	2 1,707.8	8 1,405.3	.3 10,959.9	100.0	0 1,399.3	3 1,471.7	7 1,314.3	3 1,604.6	.6 1,216.1	1 1,098.3	8,104.2	.2

FIG. A-37

N/C MACHINE UTILIZATION NAVAIREWORKFAC ALAMEDA 1 JUL 77 — 31 DEC 77 CUTTING TIME (HOURS): TOTAL & PER WORKDAY

			(NU	MON JMBER OF N		3)		
MACHINE/ PROCESS	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%
LATHES	353.6 (17.7)	639.8 (27.8)	335.9 (16.0)	423.5 (22.3)	655.9 (31.2)	426.9 (20.3)	2,835.6 (22.7)	43.7
DRILLS	106.3 (5.3)	116.3 (5.1)	74.7 (3.6)	40.0 (2.1)	132.9 (6.3)	99.6 (4.7)	569.8 (4.6)	8.8
PUNCH		56.0 (2.7)	96.0 (4.6)	0.0		16.0 (0.8)	168.0 (1.3)	2.6
MILLS/BORING MILL	349.9 (17.5)	503.2 (21.9)	337.3 (16.1)	349.5 (18.4)	519.7 (24.7)	81.0 (3.9)	2,140.6 (17.1)	33.0
MACHINING CENTERS	190.8 (9.5)	148.8 (6.5)	27.2 (1.3)	52.1 (2.7)	103.1 (4.9)	83.0 (4.0)	605.0 (4.8)	9.3
GRINDER				0.0			. 0.0	0.0
ROUTER		84.0 (3.7)	63.0 (3.0)	0.0		23.5 (1.1)	170.5 (1.4)	2.6
TOTAL	1,000.6 (50.0)	1,548.1 (67.3)	934.1 (44.5)	865.1 (45.5)	1,411.6 (67.2)	730.0 (34.8)	6,489.5 (51.9)	100.0

FIG. A-38

N/C MACHINE UTILIZATION NAVAIREWORKFAC CHERRY POINT 1 JUL 77 — 31 DEC 77 CUTTING TIME (HOURS): TOTAL & PER WORKDAY

MACHINE/	MONTH (NUMBER OF WORKDAYS)											
PROCESS	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%				
LATHES	119.0 (6.0)	260.0 (11.3)	85.0 (4.0)	184.0 (9.7)	195.5 (9.3)	89.0 (4.2)	932.5 (7.5)	16.2				
PUNCH	31.0 . (1.6)	43.0 (1.9)	51.0 (2.4)	14.0 (0.7)	29.0	8.0 (0.4)	176.0 (1.4)	3.1				
MILLS	190.5 (9.5)	304.0 (13.2)	362.5 (17.3)	230.0 (12.1)	261.5 (12.5)	195.5 (9.3)	1,544.0 (12.4)	26.8				
MACHINING CENTERS	439.0 (22.0)	501.1 (21.8)	414.0 (19.7)	461.6 (24.3)	647.5 (30.8)	637.9* (30.4)	3,101.1 (24.8)	53.9				
TOTAL	779.5 (39.0)	1,108.1 (48.2)	912.5 (43.5)	889.6 (46.8)	1,133.5 (54.0)	930.4 (44.3)	5,753.6 (46.0)	100.0				

^{*} MONARCH TC 1 ADDED 12/77

FIG. A-39

N/C MACHINE UTILIZATION NAVAIREWORKFAC JACKSONVILLE 1 JUL 77 — 31 DEC 77 CUTTING TIME (HOURS): TOTAL & PER WORKDAY

MACHINE/		MONTH (NUMBER OF WORKDAYS)										
PROCESS	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%				
LATHES	97.5 (4.9)	144.5 (6.3)	164.0 (7.8)	91.0 (4.8)	111.3 (5.3)	102.0 (4.9)	710.3 (5.7)	16.3				
DRILLS	9.0 (0.5)	0.0	8.0 (0.4)	12.0 (0.6)	0.0	0.0	29.0 (0.2)	0.7				
MILLS	116.5 (5.8)	171.5 (7.5)	141.5 (6.7)	63.0 (3.3)	121.0 (5.8)	54.0 (2.6)	667.5 (5.3)	15.3				
MACHINING CENTERS	666.5 (33.3)	804.5 (35.0)	334.1 (15.9)	524.5 (27.6)	309.0 (14.7)	309.5 (14.7)	2,948.1 (23.6)	67.7				
TOTAL	889.5 (44.5)	1,120.5 (48.7)	647.6 (30.8)	690.5 (36.3)	541.3 (25.8)	465.5 (22.2)	4,354.9 (34.8)	100.0				

FIG. A-40

N/C MACHINE UTILIZATION NAVAIREWORKFAC NORFOLK 1 JUL 77 — 31 DEC 77

CUTTING TIME (HOURS): TOTAL & PER WORKDAY

MACHINE/			(1)	MON IUMBER OF	NTH WORKDAY	S)		
PROCESS	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%
LATHES	310.8 (15.5)	431.2 (18.7)	362.4 (17.3)	371.2 (19.5)	322.0 (15.3)	508.8 (24.2)	2,306.4 (18.5)	21.8
DRILLS	224.4 (11.2)	187.6 (8.2)	236.7 (11.3)	215.6 (11.3)	211.3 (10.1)	230.5 (11.0)	1,306.1 (10.4)	12.4
MILLS/BORING MILL	59.1 (3.0)	161.6 (7.0)	86.1 (4.1)	78.2 (4.1)	107.3 (5.1)	102.6 (4.9)	594.9 (4.8)	5.6
MACHINING CENTERS	553.8 (27.7)	959.3 (41.7)	955.0 (45.5)	1,210.6 (63.7)	1,334.7 (63.6)	1,321.7 (62.9)	6,335.1 (50.7)	60.0
TUBE BENDER	1 1		_	0.0	16.8 (0.8)	-	16.8 (0.1)	0.2
TOTAL	1,148.1 (57.4)	1,739.7 (75.6)	1,640.2 (78.1)	1,875.6 (98.7)	1,992.1 (94.9)	2,163.6 (103.0)	10,559.3 (84.5)	100.0

FIG. A-41

N/C MACHINE UTILIZATION NAVAIREWORKFAC NORTH ISLAND 1 JUL 77 — 31 DEC 77 CUTTING TIME (HOURS): TOTAL & PER WORKDAY

MACHINE/			(1)		NTH WORKDAY	S)		
PROCESS	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%
LATHES	281.3 (14.1)	309.9 (13.5)	239.7 (11.4)	212.0 (11.2)	410.1 (19.5)	335.2 (16.0)	1,788.2 (14.3)	12.5
DRILL	184.0 (9.2)	184.0 (8.0)	168.0 (8.0)	159.0 (8.4)	168.0 (8.0)	192.0 (9.1)	1,055.0 (8.4)	7.4
PUNCHES	57.0 (2.9)	118.5 (5.2)	104.0 (5.0)	56.5 (3.0)	73.5 (3.5)	141.0 (6.7)	550.5 (4.4)	3.8
MILLS/BORING MILL	611.7 (30.6)	612.5 (26.6)	685.5 (32.6)	742.0 (39.1)	761.0 (36.2)	714.0 (34.0)	4,126.7 (33.0)	28.8
MACHINING CENTERS	1,202.4 (60.1)	968.0 (42.1)	1,057.7 (50.4)	928.5 (48.9)	949.5 (45.2)	533.8 (25.4)	5,639.9 (45.1)	39.4
GRINDER	50.0 (2.5)	100.0 (4.3)	77.0 (3.7)	78.0 (4.1)	79.0 (3.8)	62.0 (3.0)	446.0 (3.6)	3.1
ROUTER	101.0 (5.1)	152.0 (6.6)	121.0 (5.8)	112.0 (5.9)	68.0 (3.2)	156.0 (7.4)	710.0 (5.7)	5.0
TOTAL	2,487.4 (124.4)	2,444.9 (106.3)	2,452.9 (116.8)	2,288.0 (120.4)	2,509.1 (119.5)	2,134.0 (101.6)	14,316.3 (114.5)	100.0

FIG. A-42

N/C MACHINE UTILIZATION NAVAIREWORKFAC PENSACOLA 1 JUL 77 — 31 DEC 77 CUTTING TIME (HOURS): TOTAL & PER WORKDAY

MACHINE/			(1		NTH WORKDAY	S)		
PROCESS	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%
LATHES	284.2	229.8	410.0	536.2	513.5	300.7	2,274.4	28.1
	(14.2)	(10.0)	(19.5)	(28.2)	(24.5)	(14.3)	(18.2)	1
DRILLS	141.0	138.5	118.0	186.0	303.0	219.0	1,105.5	13.6
	(7.1)	(6.0)	(5.6)	(9.8)	(14.4)	(10.4)	(8.8)	
PUNCH	84.0	72.2	54.0	59.5	4.0	28.0	301.7	3.7
	(4.2)	(3.1)	(2.6)	(3.1)	(0.2)	(1.3)	(2.4)	
MILLS/BORING	103.7	90.5	115.4	92.7	35.3	84.0	521.6	6.4
MILL	(5.2)	(3.9)	(5.5)	(4.9)	(1.7)	(4.0)	(4.2)	
MACHINING	786.4	932.7	613.9	727.2	357.0	466.5	3,883.7	47.9
CENTERS	(39.3)	(40.6)	(29.2)	(38.3)	(17.0)	(22.2)	(31.1)	
TUBE BENDER	0.0	8.0	3.0	3.0	3.3	0.0	17.3	0.2
	(0.0)	(0.3)	(0.1)	(0.2)	(0.2)	(0.0)	(0.1)	
TOTAL	1,399.3	1,471.7	1,314.3	1,604.6	1,216.1	1,098.2	8,104.2	100.0
	(70.0)	(64.0)	(62.6)	(84.5)	(57.9)	(52.3)	(64.8)	

FIG. A-43
N/C MACHINE UTILIZATION

NAVAIREWORKFAC ALAMEDA 1 JUL 77 — 31 DEC 77

MACHINE/		PRODUCTI	ON TIME ¹ (HOURS)		CUTTING TIME ¹ (HOURS)				
PROCESS	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%	
LATHES	1,635.0	1,918.7	3,553.7	38.5	1,329.3	1,506.3	2,835.6	43.7	
DRILLS	488.0	461.7	949.7	10.3	297.3	272.5	569.8	8.8	
PUNCH	152.0	34.3	186.3	2.0	152.0	16.0	168.0	2.6	
MILLS/BORING MILL	1,944.2	1,399.6	3,343.8	36.2	1,190.4	950.2	2,140.2	33.0	
MACHINING CENTERS	477.8	496.4	974.2	10.6	366.8	238.2	605.0	9.3	
GRINDER					0.0	0.0	0.0	0.0	
ROUTER	180.5	42.5	223.0	2.4	147.0	23.5	170.5	2.6	
TOTAL	4,877.5	4,353.2	9,230.7	100.0	3,482.8	3,006.7	6,489.5	100.0	

¹ N/C MACHINE UTILIZATION REPORT

FIG. A-44 N/C MACHINE UTILIZATION

NAVAIREWORKFAC CHERRY POINT 1 JUL 77 - 31 DEC 77

MACHINE/		PRODUCTI	ON TIME ¹ (HOURS)	CUTTING TIME ¹ (HOURS)				
PROCESS	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%
LATHES	519.5	539.0	1,058.5	15.7	464.0	468.5	932.5	16.2
PUNCH	184.0	82.0	266.0	3.9	125.0	51.0	176.0	3.1
MILLS	966.0	814.0	1,780.0	26.4	857.0	687.0	1,544.0	26.8
MACHINING CENTERS	1,573.2	2,066.5	3,639.7	54.0	1,354.1	1,747.0	3,101.1	53.9
TOTAL	3,242.7	3,501.5	6,744.2	100.0	2,800.1	2,953.5	5,753.6	100.0

¹ N/C MACHINE UTILIZATION REPORT

FIG. A-45

N/C MACHINE UTILIZATION NAVAIREWORKFAC JACKSONVILLE 1 JUL 77 — 31 DEC 77

MACHINE/	Р	ON TIME ¹ (HOURS)	CUTTING TIME ¹ (HOURS)				EXPENDED HOURS ²					
PROCESS	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%
LATHES	566.5	507.0	1,073.5	17.0	406.0	304.3	710.3	16.3	186.5	256.9	443.4	15.6
DRILLS	86.0	216.0	302.0	4.8	17.0	12.0	29.0	0.7	43.0	84.9	127.9	4.5
MILLS	712.9	553.0	1,265.9	20.1	429.5	238.0	667.5	15.3	156.8	248.1	404.9	14.2
MACHINING CENTERS	2,175.6	1,479.7	3,655.3	58.1	1,805.1	1,143.0	2,948.1	67.7	1,223.6	646.7	1,870.3	65.7
TOTAL	3,541.0	2,755.7	6,296.7	100.0	2,657.6	1697.3	4,354.9	100.0	1,609.9	1,236.6	2,846.5	100.0

¹ N/C MACHINE UTILIZATION REPORT

² GEOGRAPHICAL AREA REPORT

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FIG. A-46

N/C MACHINE UTILIZATION NAVAIREWORKFAC NORFOLK 1 JUL 77 — 31 DEC 77

MACHINE/		PRODUCT	ION TIME ¹ (HOURS)	CUTTING TIME ¹ (HOURS)				
PROCESS	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%
LATHES	1,525.3	1,511.9	3,037.2	22.6	1,104.4	1,202.0	2,306.4	21.8
DRILLS	792.3	841.2	1,633.5	12.1	648.7	657.4	1,306.1	12.4
MILLS/BORING MILL	367.7	346.3	714.0	5.3	306.8	288.1	594.9	5.6
MACHINING CENTERS	3,309.3	4,690.4	7,999.7	59.4	2,468.1	3,867.0	6,335.1	60.0
TUBE BENDER	=	77.5	77.5	0.6	-	16.8	16.8	0.2
TOTAL	5,994.6	7,467.3	13,461.9	100.0	4,528.0	6,031.3	10,559.3	100.0

¹ N/C MACHINE UTILIZATION REPORT

FIG. A-47

N/C MACHINE UTILIZATION

NAVAIREWORKFAC NORTH ISLAND

1 JUL 77 — 31 DEC 77

MACHINE/		PRODUCTI	ION TIME ¹ (HOURS)	CUTTING TIME ¹ (HOURS)				
PROCESS	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%
LATHES	1,268.9	1,521.8	2,790.7	16.3	830.9	957.3	1,788.2	12.5
DRILL	536.0	519.0	1,055.0	6.2	536.0	519.0	1,055.0	7.4
PUNCH	309.5	337.5	647.0	3.8	279.5	271.0	550.5	3.8
MILLS/BORING MILL	1,983.7	2,262.1	4,245.8	24.8	1,909.7	2,217.0	4,126.7	28.8
MACHINING CENTERS	3,777.0	3,209.2	6,986.2	40.8	3,228.1	2,411.8	5,639.9	39.4
GRINDER	353.5	337.5	691.0	4.0	227.0	219.0	446.0	3.1
ROUTER	374.0	344.0	718.0	4.2	374.0	336.0	710.0	5.0
TOTAL	8,602.6	8,531.1	17,133.7	100.0	7,385.2	6,931.1	14,316.3	100.0

¹ N/C MACHINE UTILIZATION REPORT

FIG. A-48

N/C MACHINE UTILIZATION

NAVAIREWORKFAC PENSACOLA

1 JUL 77 — 31 DEC 77

MACHINE/		PRODUCTI	ON TIME ¹ (HOURS)	CUTTING TIME ¹ (HOURS)				
PROCESS	4th QTR FY 77	1st QTR FY 78	TOTAL	%	4th QTR FY 77	1st QTR FY 78	TOTAL	%
LATHES	1,131.0	1,575.7	2,706.7	24.7	924.0	1,350.4	2,274.4	28.1
DRILLS	559.0	809.0	1,368.0	12.5	397.5	708.0	1,105.5	13.6
PUNCH	279.2	138.0	417.2	3.8	210.2	91.5	301.7	3.7
MILLS/BORING MILL	373.5	266.3	639.8	5.8	309.6	212.0	521.6	6.4
MACHINING CENTERS	3,331.4	2,463.5	5,794.9	52.9	2,333.0	1,550.7	3,883.7	47.9
TUBE BENDER	22.5	10.8	33.3	0.3	11.0	6.3	17.3	0.2
TOTAL	5,696.6	5,263.3	10,959.9	100.0	4,185.3	3,918.9	8,104.2	100.0

¹ N/C MACHINE UTILIZATION REPORT

FIG. A-49

N/C MACHINE UTILIZATION
PRODUCTION TIME (HOURS)

1 JUL 77 — 31 DEC 77

MACHINE/ PROCESS	NAVAIREWORKFAC							
	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
LATHES	3,553.7	1,058.5	1,073.5	3,037.2	2,790.7	2,706.7	14,220.3	22.3
DRILLS	949.7	-	302.0	1,633.5	1,055.0	1,368.0	5,308.2	8.3
PUNCHES	186.3	266.0	-	_	647.0	417.2	1,516.5	2.4
MILLS/BORING MILL	3,343.8	1,780.0	1,265.9	714.0	4,245.8	639.8	11,989.3	18.8
MACHINING CENTERS	947.2	3,639.7	3,655.3	7,999.7	6,986.2	5,794.9	29,050.0	45.5
GRINDERS	_	_	_	-	691.0		691.0	1.1
ROUTERS	223.0	-	-	5 – 5	718.0	1-1-	941.0	1.5
TUBE BENDERS	=	_		77.5	-	33.3	110.8	0.2
TOTAL	9,230.7	6,744.2	6,296.7	13,461.9	17,133.7	10,959.9	63,827.1	100.0
%	14.5	10.6	9.9	21.1	26.8	17.2	100.0	-

FIG. A-50

N/C MACHINE UTILIZATION
CUTTING TIME (HOURS)

1 JUL 77 — 31 DEC 77

			NAV	AIREWORKFAC	:			
MACHINE/ PROCESS	ALAMEDA	CHERRY POINT	JACKSON- VILLE	NORFOLK	NORTH ISLAND	PENSACOLA	TOTAL	%
LATHES	2,835.6	932.5	710.3	2,306.4	1,788.2	2,274.4	10,847.4	21.9
DRILLS	569.8	_	29.0	1,306.1	1,055.0	1,105.5	4,065.4	8.2
PUNCHES	168.0	176.0	-	: -	550.5	301.7	1,196.2	2.4
MILLS/BORING MILL	2,140.6	1,544.0	667.5	594.9	4,126.7	521.6	9,595.3	19.4
MACHINING CENTERS	605.0	3,101.1	2,948.1	6,335.1	5,639.9	3,883.7	22,512.9	45.4
GRINDERS	·	_	-	_	446.0	-	446.0	0.9
ROUTERS	170.5	-	-	-	710.0	-	880.5	1.8
TUBE BENDERS		-		16.8	-	17.3	34.1	0.1
TOTAL	6,489.5	5,753.6	4,354.9	10,559.3	14,316.3	8,104.2	49,577.8	100.0
%	13.1	11.6	8.8	21.3	28.9	16.3	100.0	-

FIGURE A-51

MACHINE USAGE NAVAIREWORKFAC JACKSONVILLE 1 JUL 77 – 31 DEC 77

EXPENDED HOURS: TOTAL AND PER WORK DAY

MONTH (NUMBER OF WORKDAYS)			771311	CONVEN	TIONAL							NUMERICAL	CONTROL			_
MACHINE/PROCESS	JUL (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	%	JUL . (20)	AUG (23)	SEP (21)	OCT (19)	NOV (21)	DEC (21)	TOTAL (125)	Ľ
LATHES/AUTOMATIC BAR MACHINE	1,646.2 (82.3)	1,728.0 (75.1)	1,988.7 (94.7)	1,589.0 (83.6)	1,819.2 (86.6)	1,525.1 (72.6)	10,296.2 (82.4)	29.2	63.4 (3.2)	40.5 (1.8)	82.6 (3.9)	15.2 (0.8)	182.0 (8.7)	59.7 (2.8)	443.4 (3.5)	
AUTOMATIC SCREW MACHINES	121.9 (6.1)	14.2 (0.6)	7.0 (0.3)	37.3 (2.0)	2:	26.8 (1.8)	217.2 (1.7)	0.6		-	7:	-	=	-	-	
DRILLS	364.7 (18.2)	767.5 (33.4)	555.3 (26.4)	528.5 (27.8)	698.1 (33.2)	405.5 (19.2)	3,319.6 (26.6)	9,4	12.0 (0.6)	22.9 (1.0)	8.1 (0.4)	19.1 (1.0)	48.2 (2.3)	17.6 (0.8)	127.9 (1.0)	
BORERS/BORING MACHINE		19.9 (0.9)	42.2 (2.0)	17.6 (0.9)	8.C (0.4)	44.9 (2.1)	132.6 (1.1)	0.4		=	8	-	To.	-	-	
HONES	40.8 (2.0)	119.8 (5.2)	358.4 (17.1)	207.1 (10.9)	150.7 (7.2)	95.6 (4.6)	972.4 (7.8)	2.8	-	-	-	-	-	-	50	
GRINDERS	1,580.1 (79.0)	2,673.5 (116.2)	2,922.0 (139.1)	2,813.4 (148.1)	2,467.9 (117.5)	1,831.2 (87.2)	14,288.1 (114.3)	40.6	7.1	+	:=	-	-	-	*:	
ELECTRICAL DISCHARGE MACHINES	126.4 (6.3)	258.7 (11.2)	131.4 (6.3)	294.7 (15.5)	183.7 (8.7)	165.9 (7.9)	1,160.8 (9.3)	3.3	-	~	-	1*	-	-	ST.	Ī
ELECTRON BEAM WELDERS	56.6 (2.8)	163.4 (7.1)	71,3 (3.4)	172.7 (9.1)	229.4 (10.9)	100.8 (4.8)	794.2 (6.4)	2.3	25	-	-	н	-		-	
MILLS/BORING MILL	282.8 (14.1)	438.4 (19.1)	615.8 (29.3)	330.9 (17.4)	337.1 (16.1)	308.5 (14.7)	2,313.5 (18.5)	6.6	22.3 (1.1)	56.7 (2.5)	77.8 (3.7)	139.0 (7.3)	47,7 (2.3)	61.4 (2.9)	404.9 (3.2)	
MACHINING CENTERS	-	-		-	-	-	-	1	307.7 (15.4)	495.6 (21.5)	420.3 (20.0)	281.0 (14.8)	221.4 (10.5)	144.3 (6.9)	1,870.3 (15.0)	
PLANER	-	-		-	=	-	-	-	-		計	-	155	э	-	100
SHAPERS		-	:5	-	5	-	i n .	-	-	-	-	-	7.7	-	-	
вгоасн	0.4 (-)	36.6 (1.6)	3.7 (0.2)	9.9 (0.5)	0.9 (-)	0.9 ()	52.4 (0.4)	0.1	-	-	1770	-	-	17.	-	
DEBURRING MACHINE	138.6 (6.9)	199.7 (8.7)	187,5 (8.9)	182.4 (9.6)	197.5 (9.4)	126.8 (6.0)	1,032.5 (8.3)	2.9	-	-	-	-	-	-		
LAPPING MACHINE	6.3 (0.3)	12.4 (0.5)	20	-	-	-	18.7 (0.1)	0.1		-	-	-		-	-	1
HANDWORK	98.7 (4.9)	152.0 (6.6)	78,1 (3.7)	104.4 (5.5)	89.9 (4.3)	109.1 (5.2)	632.2 (5.1)	1.8	-	-	-	-	12	-	12	1
TOTAL	4,463.5 (223.2)	6,584.1 (286.3)	6,961.4 (331.5)	6,287.9 (330.9)	6,182.4 (294.4)	4,751.1 (226.2)	35,230.4 (281.8)	100.1	405.4 (20.3)	615.7 (26.8)	588.8 (28.0)	454.3 (23.9)	499.3 (23.8)	283.0 (13.5)	2,846.5 (22.8)	1

DATA SOURCE: GEOGRAPHICAL AREA REPORT

FIG. A-52

MACHINE USAGE NAVAIREWORKFAC JACKSONVILLE 1 JUL 77 — 31 DEC 77

		CONVEN.	TIONAL		N	UMERICAL	CONTROL	
MACHINE/	EXP	ENDED HO	URS	%	EXP	ENDED HO	URS	%
PROCESS	4th QTR FY 77	1st QTR FY 78	TOTAL	-	4th QTR FY 77	1st QTR FY 78	TOTAL	
LATHES/AUTOMATIC BAR MACHINE	5,362.9	4,933.3	10,296.2	29.2	186.5	256.9	443.4	15.6
AUTOMATIC SCREW MACHINES	143.1	74.1	217.2	0.6				
DRILLS	1,687.5	1,632.1	3,319.6	9.4	43.0	84.9	127.9	4.5
BORERS/BORING MACHINE	62.1	70.5	132.6	0.4				
HONES	519.0	453.4	972.4	2.8				
GRINDERS	7,175.6	7,112.5	14,288.1	40.6				
ELECTRICAL DISCHARGE MACHINES	516.5	644.3	1,160.8	3.3				
ELECTRON BEAM WELDERS	291.3	502.9	794.2	2.3				
MILLS/BORING MILL	1,337.0	976.5	2,313.5	6.6	156.8	248.1	404.9	14.2
MACHINING CENTERS					1,223.6	646.7	1,870.3	65.7
PLANER								
SHAPERS								
BROACH	40.7	11.7	52.4	0.1	100			
DEBURRING MACHINE	525.8	506.7	1,032.5	2.9	1 = 20			
LAPPING MACHINE	18.7	_	18.7	0.1				
HANDWORK	328.8	303.4	632.2	1.8				
TOTAL	18,009. 0	17,221.4	35,230.4	100.1	1,609.9	1,236.6	2,846.5	100.0

TABLE A-1
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG <u>1</u> OF <u>4</u>

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: ELECTRICAL/ELECTRONIC

TO SHOP VEAC	ALAME	EDA	CHERRY	POINT	JACKSONV	ILLE	NORFO		NORTH IS		PENSAC	COLA	EQUIV TOTA	L
MANU TECH	EQUIV PEOPLE	_	EQUIV PEOPLE	%	EQUIV PEOPLE		EQUIV PEOPLE		EQUIV PEOPLE		EQUIV PEOPLE	%	PEOPLE	%
OPERATION AIRCRAFT EQUIPMENT/WIRING: - MODIFY - REPAIR - REPLACE - INSTALL CHECK/TEST: - OPERATIONAL - DITMCO 1/	12.85 88.82 3.54 8.22 3.10	4.2 29.0 1.2 2.7	25.97 14.18 3.80 9.83 16.39 5.21	17.6 9.6 2.6 6.7 11.1 3.5	1.63 7.15 1.30 0.80 26.17 6.25	0.5 2.4 0.4 0.3 8.7 2.1	15.81 21.10 4.81	3.5 10.3 0.9 3.6 4.8 1.1	45.47	11.0 17.1 5.8 15.0 10.6 2.4	5.58	4.8 11.9 8.3 4.6 7.7 1.8	118.47 266.46 63.44 105.18 141.57 35.45 71.03	6.1 13.8 3.3 5.4 7.3 1.8
- OTHER AUTOMATIC TEST 1/ EQUIPMENT CORRECT DISCREPANCIES EVALUATE REPAIR REWORK OVERHAUL	1.16 3.93 7.22 10.17 38.16 27.42	0.4 1.3 2.4 3.3 12.5 9.0	11.15 15.21	10.3	0.23 16.63 39.64 43.51	5.5 13.2 14.5	9.41 9.28 2 .67.36 5 25.86		3.80 7.10 18.63 9.59	3.5 0.9 1.7 4.3 2.2 1.7	3.49 0.55 31.60 46.13	0.7 1.1 0.2 10.0 14.7 20.9	24.24 42.89 178.55 178.46	1. 2. 9.

PG 2 OF 4

TABLE A-1 PRODUCTION SHOPS SURVEY (Equivalent People & Percent of NAVAIREWORKFAC Total)

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: ELECTRICAL/ELECTRONIC

NAVAIREWORKFAC	ALAM	EDA	CHERRY	POINT	JACKSON		NORF	OLK	NORTH IS	SLAND	PENSA	COLA	TOTA	L
MANU TECH OPERATION	EQUIV PEOPLE	e; /6	PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	PEOPLE PEOPLE	%	PEOPLE PEOPLE	%	PEOPLE	%
CALIBRATE	20.79	6.8	0.58	0.4	17.80	5.9	20.17	4.6	2.05	0.5	0.66	0.2	62.05	3.2
CROSS CHECK	0.36	0.1	0.39	0.3	2.30	0.8	1.62	0.4	1.44	0.3	0.02	0.0	6.13	0.3
CERTIFY	2.69	0.9	0.80	0.5	5.89	2.0	6.36	1.4	6.98	1.6	1.32	0.4	24.04	1.2
TEST	18.83	6.2	3.00	2.0	15.00	5.0	22.23	5.1	9.23	2.1	7.71	2.5	76.00	3.9
DISASSEMBLE	12.83	4.2	5.46	3.7	15.36	5.1	19.45	4.4	11.02	2.6	6.59	2.1	70.71	3.7
ASSEMBLE	16.50	5.4	3.57	2.4	26.30	8.8	28.30	6.4	9.82	2.3	8.87	2.8	93.36	4.8
COMPLY WITH TECHNICAL DIRECTIVES	7.38	2.4	3.43	2.3	8.10	2.7	40.88	9.3	28.50	6.6	1.99	0.6	90.28	4.
HERMETICALLY SEALED INSTRU- MENTS AND COMPONENTS:														
- UNSEALING	2.28	0.7	2.00	1.4	0.65	0.2	3.68	0.8	1.01	0.2	0.24	0.1	9.86	0.5
- LEAK-TESTING	2.58	0.8	0.92	0.6	1.00	0.3	0.93	0.2	0.99	0.2	3.44	1.1	9.86	0.5
- PURGING	0.75	0.2	0.74	0.5	0.80	0.3	1.13	0.3	0.10	0.0	0.99	0.3	4.51	0.3
- FILLING	0.45	0.1	0.92	0.6	0.50	0.2	2.21	0.5	0.32	0.1	0.21	0.1	4.61	0.
- RESEALING	3.30	1.1	0.56	0.4	0.75	0.2							4.61	0.
- FOG-TESTING	0.40	0.1		ľ	0.30	0.1	0.22	0.1					0.92	0.

TABLE A-1
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 3 OF 4

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: ELECTRICAL/ELECTONIC

NAVAIREWORKFAC	ALAM	IEDA	CHERRY	POINT	JACKSON	VILLE	NORFO		NORTH I		PENSA	COLA	TOTA	L
MANU TECH OPERATION	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE		EQUIV PEOPLE		EQUIV PEOPLE	%	EQUIV PEOPLE	%	PEOPLE	%
REFINISH:	LEGIBE													
- DIALS	1.05	0.3			0.13	0.0	0.39	0.1	0.11	0.0	0.11	0.0	1.79	0.1
- POINTERS	0.72	0.2					0.11	0.0			0.07	0.0	0.90	0.0
- PANELS	0.33	0.1	1.53	1.0	0.33	0.1	1.89	0.4	1.63	0.4	0.19	0.1	5.90	0.3
- NAME PLATES	8.80	2.9	0.87	0.6	0.20	0.1	1.10	0.3	0.44	0.1	0.04	0.0	11.45	0.6
MANUFACTURE:														
- PRINTED CIRCUIT BOARDS									70 1		0.32	0.1	0.32	0.0
REPAIR:														
- PRINTED CIRCUIT BOARDS	0.30	0.1							0.07	0.0			0.37	0.0
- MINIATURE INTEGRATED CIRCUITS			6.12	4.2	3.11	1.0	3.30	0.8	19.06	4.4	7.68	2.4	39.27	2.0
- MICRO-MINIATURE INTEGRATED CIRCUITS			1.08	0.7	2.74	0.9	1.91	0.4	9.53	2.2	1.38	0.4	16.64	0.9
INSTALL CABLING/EQUIPMENT							2.80	0.6					2.80	0.1
PHOTO PROCESS	1.10	0.4											1.10	0.1

0

TABLE A-1
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 4 OF 4

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: ELECTRICAL/ELECTRONIC

NAVAIREWORKFAC		MEDA	CHERRY	POINT	JACKSON	VILLE	NORF EQUIV	OLK	NORTH I	SLAND	PENSA EQUIV	COLA	EQUIV TOT.	AL
MANU TECH OPERATION	PEOPLE		EQUIV PEOPLE	%	EQUIV PEOPLE	%	PEOPLE	%	PEOPLE	%	PEOPLE	%	PEOPLE	%
TOTAL	306.03	100.0	147.37	100.0	300.27	100.0	438.94	100.0	429.84	1,00.0	314.63	100.0	1,937.08	100.0
1/ SEE ALSO TABLE A-4 - "TESTING"												5		

TABLE A-3
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 1 OF 5

NAVAIREWORKFAC	ALAM	EDA	CHERRY	POINT	JACKSON		NORF	OLK	NORTH IS	SLAND	PENSA	COLA	EQUIV TOTA	<u>L</u>
MANU TECH OPERATION	PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	PEOPLE PEOPLE	%	EQUIV PEOPLE	%	PEOPLE	%
PHOTO TEMPLATE		DHI AUSSYST VIII	0.40	0.2	2.25	1.1					14.00	6.6	16.65	1.3
PHOTO ENGRAVING										Š				
MANUFACTURE KIRKSITE DIES:														1000 N 1942/1
- DROP HAMMER			0.54	0.3									0.54	0.0
- PUNCH PRESS														
- STRETCH PRESS			0.18	0.1									0.18	0.0
- HYDROFORM/ROLL FORM			0.36	0.2					4.5				0.36	0.0
FABRICATE METAL PARTS:														
- BAND SAW			1.00	0.5	1.50	0.7							2.50	0.2
- DROP HAMMER	1.36	1.0	0.90	0.5			0.17	0.1					2.43	0.2
- PUNCH PRESS	1.52	1.1	0.36	0.2	4.75	2.3	0.35	0.2	2.09	0.6	1.40	0.7	10.47	0.8
- ROUTER	3.02	2.2	0.70	0.4	1.65	0.8	0.02	0.0	3.96	1.2	2.80	1.3	12.15	0.9
- RADIAL DRAW FORMER					2 10	1.0		-	3.63	1.1			5.73	0.4
- BELT SANDER			0.40	0.2									0.40	0.0
- STRETCH PRESS	0.16	0.1	0.18	0.1	2.10	1.0	0.35	0.2			0.70	0.3	3.49	0.3

PG 2 OF 5

TABLE A-3 PRODUCTION SHOPS SURVEY (Equivalent People & Percent of NAVAIREWORKFAC Total)

NAVAIREWORKFAC	ALAM	EDA	CHERRY	TNIOS	JACKSONV EQUIV		NORFO EQUIV		NORTH I	SLAND	PENSA	COLA	EQUIV TOTA	<u>L</u>
MANU TECH OPERATION	EQUIV PEOPLE	%	EQUIV PEOPLE	%	PEOPLE		PEOPLE		PEOPLE	%	PEOPLE	%	PEOPLE	%
- SPINNING LATHE	0.38	0.3	0.18	0.1									0.56	0.0
- HYDROFORM/ROLL FORM	4.10	2.9	1.44	0.7	1.10	0.5	0.51	0.2		107	0.70	0.3	7.85	0.6
- TURRET PUNCH	6.16	4.4			4.66	2.3	0.47	0.2	3.74	1.1	1.62	0.8	16.65	1.3
- SHEAR	2.14	1.5	1.31	0.7	13.86	6.8	6.36	3.0	9.97	3.1	5.07	2.4	38.71	3.0
- BRAKE	4.97	3.6	1.69	0.9	10.88	5.3	5.65	2.7	6.41	2.0	3.67	1.7	33.27	2.6
- DRILL					1.40	0.7							1.40	0.1
LAYOUT					3.00	1.5							3.00	0.2
MANUFACTURE PLASTER PATTERNS AND FORMS			0.54	0.3			0.02	0.0	0.35	0.1			0.91	0.1
HEAT TREAT	9.00	6.4	1.26	0.6									10.26	0.8
PACK ALUMINIZE			0.72	0.4									0.72	0.1
METAL SPRAY:														
- PREPARING FOR SPRAY			1.80	0.9									1.80	0.1
- METAL SPRAYING			0.30	0.2				1					0.30	0.0
- CLEANING/MASKING			0.90	0.5				j i					0.90	0.1

TABLE A-3
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 3 OF 5

NAVAIREWORKFAC	ALAM	EDA	CHERRY	POINT	JACKSON	ILLE	NORFO	DLK	NORTH IS	SLAND	PENSA	COLA	TOTA	<u>L</u>
MANU TECH OPERATION	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE		PEOPLE PEOPLE	%	EQUIV PEOPLE	%	PEOPLE	%
RIGID METAL TUBING:														
- MANUFACTURE	0.85	0.6	2.90	1.5	3.00	1.5							6.75	0.5
- REPAIR	3.00	2.1	0.70	0.4	0.34	0.2			0.21	0.1			4.25	0.3
FLEXIBLE HOSE:														
- MANUFACTURE			2.80	1.4	3.00	1.5							5.80	0.4
- REPAIR			0.70	0.4	-						1.40	0.7	2.10	0.2
INCIDENTAL TO WELDING:														
- GRINDING	9.87	7.1	5.70	2.9	5.25	2.6	1.66	0.8	8.31	2.6	1.39	0.7	32.18	2.5
- PATCHING	0.85	0.6	4.71	2.4	2.26	1.1	1.31	0.6	3.91	1.2	3.61	1.7	16.65	1.3
- RIVETING	9.76	7.0	1.59	0.8	5.10	2.5	1.01	0.5	2.59	0.8	9.52	4.5	29.57	2.3
- BLENDING	3.46	2.5	2.65	1.3	2.67	1.3	0.34	0.2	3.43	1.1	1.18	0.6	13.73	1.1
- DIE CHECKING	0.56	0.4	0.53	0.3	1.73	0.8	0.33	0.2	14.25	4.4	1.05	0.5	18.45	1.4
REPAIR/REPLACE:														
- SKIN PANELS	3.56	2.6	8.05	4.1	21.42	10.5	24.70	11.6	15.94	4.9	17.61	8.3	91.28	7.1
- RIBS	2.81	2.0	8.28	4.2	8.42	4.1	6.69	3.2	14.75	4.5	9.24	4.4	50.19	3.9

PG <u>4</u> OF <u>5</u>

TABLE A-3 PRODUCTION SHOPS SURVEY (Equivalent People & Percent of NAVAIREWORKFAC Total)

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: SHEET METAL

NAVAIREWORKFAC	ALAN	MEDA	CHERRY	POINT	JACKSON		NORFO		NORTH IS	SLAND	PENSA	COLA	TOTA	L
MANU TECH OPERATION	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE		EQUIV PEOPLE	%	EQUIV PEOPLE	%	PEOPLE	%
- STRINGERS	2.56	1.8	5.52	2.8	6.10	3.0	7.19	3.4	14.68	4.5	6.12	2.9	42.17	3.3
- SPARS	6.51	4.7	3.85	2.0	3.42	1.7	3.56	1.7	7.83	2.4	11.25	5.3	36.42	2.8
- FITTINGS	2.00	1.4	6.24	3.2	7.48	3.7	13.50	6.4	7.31	2.2	10.46	4.9	46.99	3.6
MANUFACTURE/INSTALL:														
- STRUCTURAL REPAIR PARTS	9.11	6.5	39.49	20.1	19.50	9.6	43.93	20.7	14.50	4.5	24.33	11.5	150.86	11.7
REPAIR/SEAL INTEGRAL FUEL CELLS	12.83	9.2	2.96	1.5	10.20	5.0	7.49	3.5	3.35	1.0	7.51	3.5	44.34	3.4
REMOVE/TREAT CORROSION	18.50	13.3	4.46	2.3	16.22	8.0	14.93	7.0	31.89	9.8	30.85	14.6	116.85	9.1
SPOT/TACK WELDING ON:														
- STEEL			2.42	1.2			0.80	0.4	0.28	0.1			3.50	0.3
- STAINLESS STEEL	0.29	0.2	3.17	1.6			0.35	0.2					3.81	0.3
REPAIR/MODIFY:														
- AILERONS	0.31	0.2	2.07	1.1	4.37	2.1	0.18	0.1	2.53	0.8	0.84	0.4	10.30	0.8
- FLAPS	0.31	0.2	2.81	1.4	4.59	2.3	2.01	0.9	3.01	0.9	0.84	0.4	13.57	1.1
- SLATS	0.31	0.2	0.24	0.1	0.17	0.1	0.33	0.2	0.50	0.2	0.45	0.2	2.00	0.2
- FINS	0.71	0.5	0.56	0.3	1.23	0.6	5.76	2.7	2.80	0.9	1.74	0.8	12.80	1.0

PG <u>5</u> OF <u>5</u>

TABLE A-3 PRODUCTION SHOPS SURVEY (Equivalent People & Percent of NAVAIREWORKFAC Total)

NAVAIREWORKFAC		MEDA	CHERRY	15000000000000	JACKSON		NORFO	200000	NORTH I		PENSA EQUIV		EQUIV TOTA	AL
MANU TECH OPERATION	EQUIV PEOPLE	%	EQUIV PEOPLE		EQUIV PEOPLE		PEOPLE		PEOPLE	%	PEOPLE	1770	PEOPLE	7,
- STABILIZERS	1.91	1.4	6.34	3.2	3.86	1.9	5.05	2.4	7.94	2.4	1.65	0.8	26.75	2.1
- VENTRAL FINS	0.31	0.2	2.99	1.5	0.63	0.3	0.18	0.1	1.97	0.6	0.84	0.4	6.92	0.5
- LEADING EDGES	0.31	0.2	2.11	1.1	3.86	1.9	3.03	1.4	1.93	0.6	2.09	1.0	13.33	1.0
- BONDED PANELS	0.71	0.5	0.76	0.4			1.26	0.6	1.79	0.5	0.45	0.2	4.97	0.4
- FLOOR BOARDS	1.56	1.1	2.70	1.4	0.50	0.2	0.18	0.1	1.25	0.4	1.05	0.5	7.24	0.6
- ACCESS PANELS	2.47	1.8	8.97	4.6	9.73	4.8	3.37	1.6	3.31	1.0	1.99	0.9	29.84	2.3
- OTHER LAMINATED/ HONEYCOMB STRUCTURES	0.93	0.7	1.65	0.8	1.06	0.5	15.19	7.2	3.88	1.2	0.41	0.2	23.12	1.8
COMPLY WITH TECHNICAL DIRECTIVES	10.37	7.4	43.54	22.1	8.64	4.2	33.43	15.8	121.11	37.2	34.13	16.1	251.22	19.5
REPAIR FIBREGLASS				77					0.24	0.1			0.24	0.0
MISC. SHORING/ADJUSTMENTS							0.36	0.2					0.36	0.0
TOTAL	139.54	100.0	196.62	100.0	204.00	100.0	212.02	100.0	325.64	100.0	211.96	100.0	1,289.78	100.0

TABLE A- 4
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG <u>1</u> OF <u>2</u>

		1	MANUFACTU	RING T	ECHNOLOGY	FUNCT	IONAL CAT	EGORY:	TESTING	;				
NAVAIREWORKFAC	ALA	MEDA	CHERRY	POINT	JACKSON	VILLE	NORF	OLK	NORTH I	SLAND	PENSA	COLA	тот	AL
MANU TECH OPERATION	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	Z Z
NON-DESTRUCTIVE TESTING:														
- DYE PENETRANT									2.45	2.9			2.45	0.4
- MAGNAFLUX					5.42	7.1	1.50	1.4	2.49	2.9	3.60	4.1	13.01	2.4
- ZYGLO/FLUORESCENT PENETRANT					8.30	10.9	3.00	2.8	6.40	7.6	4.50	5.1	22.20	4.0
- ULTRASONIC					2.84	3.7	1.25	1.2	0.19	0.2	3.60	4.1	7.88	1.4
- RADIOGRAPHIC					1.00	1.3	4.00	3.8			4.50	5.1	9.50	1.7
- EDDY CURRENT					2.45	3.2	1.00	0.9	0.07	0.1	1.80	2.0	5.32	1.0
OPERATIONAL TESTING (INCL. TEST CELLS)	44.30	32.9	35.00	57.4	21.60	28.4	57.00	53.7	31.02	36.6			188.92	34.3
AUTOMATIC TEST EQUIPMENT: - DITMCO 1/	0.70	0.5					3.20	3.0					3.90	0.7
- NARF-5500 $\frac{1}{}$		27.57	0.96	1.6			3,25						0.96	0.2
- OTHER $\frac{1}{}$	17.32	12.8	11.04				4.05	3.8	17.40	20.5			49.81	9.0
GROUND CHECK:									- Frankoust					
- ENGINES	14.00	10.4	1.20	2.0	9.00	11.8	0.54	0.5	4.19	4.9	6.38	7.2	35.31	6.4

PG <u>2</u> OF <u>2</u>

TABLE A- 4 PRODUCTION SHOPS SURVEY (Equivalent People & Percent of NAVAIREWORKFAC Total)

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: TESTING

NAVAIREWORKFAC	VLVI	MEDA	CHERRY 1	POINT	JACKSON EQUIV	VILLE	NORF EQUIV	OLK	NORTH I		PENSA EQUIV	COLA	EQUIV TOTA	AL .
MANU TECH OPERATION	EQUIV PEOPLE	%	EQUIV PEOPLE	%	PEOPLE	%	PEOPLE	%	PEOPLE		PEOPLE	%	PEOPLE	%
- AIRCRAFT	7.00	5.2	4.25	7.0	12.60	16.6	2.70	2.5	14.65	17.3	36.13	41.1	77.33	14.0
- ELECTRICAL	7.00	5.2	1.70	2.8	9.00	11.8	2.70	2.5	5.56	6.6	14.95	17.0	40.91	7.4
- ELECTRONIC	21.23	15.7	0.85	1.4	1.80	2.4	4.86	4.6			12.55	14.3	41.29	7.5
ENGINE TESTS:														
- BALANCING			6.00	9.8					0.26	0.3			6.26	1.1
- DRESSING							12.00	11.3					12.00	2.2
- UNDRESSING							8.00	7.5	-				8.00	1.5
NITAL ETCH							0.22	0.2					0.22	0.0
COPPER SULFATE TEST							0.03	0.0					0.03	0.0
ASSEMBLY/MODIFY	23.25	17.2											23.25	4.2
OIL ANALYSIS					2.00	2.6		6					2.00	0.4
TOTAL	134.80	100.0	61.00	100.0	76.01	100.0	106.05	100.0	84.68	100.0	88.01	100.0	550.55	100.0
1/SEE ALSO TABLE A-1 - "ELECTRICAL/ELECTRONIC"														

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PG <u>1</u> OF <u>4</u>

TABLE A- 5 PRODUCTION SHOPS SURVEY (Equivalent People & Percent of NAVAIREWORKFAC Total)

NAVAIREWORKFAC	ALAM		CHERRY P		JACKSON		NORFO	DLK	NORTH I		PENSAG EQUIV	COLA	EQUIV TOT	<u>AL</u>
	EQUIV PEOPLE		EQUIV PEOPLE		EQUIV PEOPLE	%	PEOPLE	%	PEOPLE		PEOPLE	%	PEOPLE	%
SHAPING	1.00	0.6			0.14	0.1	0.80	0.5	0.44	0.2	1.32	0.8	3.70	0.4
GRINDING:					1									
- INTERNAL	8.48	5.2	3.70	4.4	10.72	10.9	5.96	3.7	10.88	3.8	8.79	5.4	48.53	5.1
- EXTERNAL	12.48	7.6	7.58	9.1	9.48	9.7	15.92	9.9	29.84	10.5	33.29	20.3	108.59	11.4
- SURFACE	3.92	2.4	2.53	3.0	2.95	3.0	4.99	3.1	2.19	0.8	4.51	2.8	21.09	2.2
- ELECTROLYTIC	1.92	1.2			1.70	1.7	0.93	0.6	0.25	0.1	0.10	0.1	4.90	. 0.5
MILLING:														
- POCKET	6.32	3.9	1.15	1.4	2.94	3.0	13.40	8.3	13.41	4.7	3.87	2.4	41.09	4.3
- GANG	5.68	3.5	4.15	5.0			0.14	0.1	4.26	1.5	1.50	0.9	15.73	1.6
- ANGULAR	5.04	3.1	8.97	10.7	3.08	3.1	7.92	4.9	13.10	4.6	3.42	2.1	41.53	4.3
- INDEX	5.68	3.5	6.41	7.7	2.80	2.9	1.74	1.1	9.27	3.3	3.59	2.2	29.49	3.1
- SPECIAL	5.68	3.5	2.67	3.2	7.00	7.1	1.78	1.1	12.05	4.2	11.69	7.1	40.87	4.3
ELECTRICAL DISCHARGE MACHINE	4.92	3.0			2.21	2.3	4.47	2.8	0.95	0.3	2.01	1.2	14.56	1.
TURNING	21.20	12.9	17.51	21.0	14.84	15.1	17.29	10.8	26.88	9.4	15.47	9.4	113.19	11.9

PG 2 OF 4

TABLE A-5 PRODUCTION SHOPS SURVEY (Equivalent People & Percent of NAVAIREWORKFAC Total)

NAVAIREWORKFAC	VLVW	IEDA	CHERRY F	POINT	JACKSON	/ILLE	NORFO	LK	NORTH I	3	PENSAC		TOTA	<u>L</u>
MANU TECH OPERATION	EQUIV PEOPLE	%	EQUIV PEOPLE	%	PEOPLE PEOPLE	%	EQUIV PEOPLE	%	PEOPLE	%	EQUIV PEOPLE		EQUIV PEOPLE	%
BORING/JIG BORING	9.92	6.0	10.77	12.9	11.31	11.5	7.04	4.4	19.34	6.8	24.08	14.7	82.46	8.6
FACING	3.92	2.4	3.02	3.6	1.68	1.7	6.80	4.2	7.59	2.7	5.44	3.3	28.45	3.0
TAPPING	5.20	3.2	1.77	2.1	1.12	1.1	2.19	1.4	5.50	1.9	3.12	1.9	18.90	2.0
THREADING	3.56	2.2	2.46	2.9	1.82	1.9	1.14	0.7	2.94	1.0	1.78	1.1	13.70	1.4
SUPER FINISHING	1.92	1.2	1.13	1.4	0.55	0.6	0.15	0.1	2.15	0.8	0.73	0.4	6.63	0.7
LAPPING									4.88	1.7			4.88	0.5
DRILLING/SLOTTING	9.48	5.8	2.55	3.1	7.22	7.4	7.44	4.6	35.31	12.4	19.69	12.0	81.69	8.6
HONING .	4.28	2.6	0.61	0.7	0.65	0.7	2.73	1.7	8.10	2.8	0.51	0.3	16.88	1.8
PUNCHING									1.18	0.4			1.18	0.1
SPOT FACING	4.56	2.8	0.30	0.4	0.45	0.5	0.33	0.2	5.67	2.0	2.41	1.5	13.72	1.4
ENGRAVING									1.55	0.5			1.55	0.2
COUNTER-SINKING	4.56	2.8	0.30	0.4	0.62	0.6	0.52	0.3	10.04	3.5	3.12	1.9	19.16	2.0
VALVE GRINDING					2.21	2.3			0.22	0.1			2.43	0.3
DEBURRING									0.29	0.1			0.29	0.0
MODIFICATION/REPAIR OF TOOLING	15.84	9.7	1.41	1.7	7.17	7.3	6.66	4.1	8.57	3.0	3.60	2.2	43.25	4.5

PG <u>3</u> OF <u>4</u>

TABLE A- 5 PRODUCTION SHOPS SURVEY (Equivalent People & Percent of NAVAIREWORKFAC Total)

NAVAIREWORKFAC	ALAM		CHERRY F	POINT	JACKSON		NORFO	OLK	NORTH I		PENSA EQUIV		EQUIV TOTA	L
MANU TECH OPERATION	EQUIV PEOPLE	%	EQUIV PEOPLE	%	PEOPLE PEOPLE		PEOPLE PEOPLE	%	EQUIV PEOPLE		PEOPLE		PEOPLE	%
MAINTAIN RESTRIKE DIES							1.74	1.1					1.74	0.2
RESTRIKE (HOT FORMING) OF AIRCRAFT ENGINE NOZZLE GUIDE VANES							1.15	0.7		*			1.15	0.1
REPLACE:) = 200	SO MORSE	9 92		
- BUSHINGS	4.20	2.6	1.53	1.8	2.00	2.0	2.05	1.3	6.82	2.4	6.42	3.9	aver each	2.4
- BEARINGS	4.20	2.6	0.59	0.7	0.62	0.6	1.54	1.0	15.91	5.6	0.81	0.5	23.67	2.5
- FITTINGS	1.00	0.6	1.15	1.4	0.85	0.9	1.03	0.6	15.89	5.6	0.46	0.3	20.38	2.1
- TRANSFER TUBES	1.92	1.2					0.69	0.4	5.65	2.0			8.26	0.9
- HELICOILS/INSERTS			0.54	0.6					1.54	0.5			2.08	0.2
- GUIDES	2.56	1.6					0.69	0.4	0.20	0.1			3.45	0.4
- CONE SEATS	0.64	0.4					0.69	0.4					1.33	0.1
- STUDS	3.92	2.4	0.67	0.8	0.17	0.2	0.49	0.3	2.17	0.8	2.17	1.3	9.59	1.0
METALLIZE							20.00	12.4					20.00	2.1
REMOVE/REWORK/INSTALL CATAPULT/ARRESTING GEAR							20.25	12.6					20.25	2.1

TABLE A- 5
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG 4 OF 4

NAVAIREWORKFAC		MEDA	CHERRY	POINT	JACKSON	VILLE	NORF	OLK	NORTH I		PENSA		EQUIV TOTA	AL
MANU TECH OPERATION	EQUIV PEOPLE		EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE		EQUIV PEOPLE		PEOPLE	%
ELECTRON BEAM WELDING			3.		1.70	1.7							1.70	0.2
TOTAL	164.00	100.0	83.47	100.0	98.00	100.0	160.66	100.0	285.03	100.0	163.90	100.0	955.06	100.0
		(g)												
									-					
*														

PG _1 OF _1

TABLE A-6 PRODUCTION SHOPS SURVEY (Equivalent People & Percent of NAVAIREWORKFAC Total)

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: HYDRAULIC/PNEUMATIC

NAVAIREWORKFAC	EQUIV	MEDA	CHERRY		JACKSON	VILLE	NORF EQUIV	OLK	NORTH I	SLAND	PENSA EQUIV		EQUIV TOT	AL_
OPERATION	PEOPLE	%%	PEOPLE		PEOPLE	%	PEOPLE	%	PEOPLE	%	PEOPLE	%	PEOPLE	%
DISASSEMBLE	36.89	16.9	12.17	14.1	4.00	10.0	14.58	21.8	9.82	9.4	4.50	10.0	81.96	14.6
CLEAN	11.85	5.4	6.76	7.9	1.52	3.8	3.46	5.2	3.52	3.4	1.35	3.0	28.46	5.1
INSPECT	14.94	6.9	3.45	4.0	2.28	5.7	3.65	5.4	10.13	9.6	4.50	10.0	38.95	6.9
REPAIR/REWORK	32.72	15.0	9.37	10.9	9.60	24.0	8.62	12.9	13.77	13.1	7.65	17.0	81.73	14.6
MODIFY	9.85	4.5	2.85	3.3	1.20	3.0	2.72	4.1	9.84	9.4	2.25	5.0	28.71	5.1
REASSEMBLE/BALANCE	64.81	29.7	34.98	40.7	7.20	18.0	23.16	34.6	39.68	37.8	13.50	30.0	183.33	32.7
TEST	46.94	21.5	16.43	19.1	14.20	35.5	10.82	16.1	18.23	17.4	11.25	25.0	117.87	21.0
TOTAL	218.00	100.0	86.01	100.0	40.00	100.0	67.01	100.0	104.99	100.0	45.00	100.0	561.01	100.0
ş														
				•										

TABLE A- 7
PRODUCTION SHOPS SURVEY
(Equivalent People & Percent of NAVAIREWORKFAC Total)

PG <u>1</u> OF <u>2</u>

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: STRIP/FINISH/PAINT

NAVAIREWORKFAC	ALAN		CHERRY I		JACKSON	/ILLE	NORF	OLK	NORTH I		PENSA	COLA	TOTA	AL
MANU TECH OPERATION	EQUIV PEOPLE	%	EQUIV PEOPLE		EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE		EQUIV PEOPLE	%	PEOPLE	%
CLEANING:									1					
- STRIPPING	19.60	19.8	14.80	18.5	13.00	8.9	1.29	2.3	35.39	21.2	13.88	15.3	97.96	15.3
- DEGREASING			0.82	1.0	2.68	1.8	0.24	0.4	3.21	1.9	0.66	0.7	7.61	1.2
- VACUBLASTING/SEED BLASTING			3.90	4.9	6.85	4.7			6.21	3.7			16.96	2.7
- CORROSION TREATING		25	3.11	3.9	2.40	1.6	0.57	1.0	7.00	4.2	0.17	0.2	13.25	2.1
- TANK SOAKING		2	2.15	2.7	1.25	0.9	0.24	0.4	0.54	0.3	1.32	1.5	5.50	0.9
- WATER SPRAY	2.80	2.8	2.00	2.5	9.25	6.3			4.45	2.7	2.20	2.4	20.70	3.2
- SCRAPING	2.80	2.8	1.00	1.3	4.59	3.1	0.57	1.0	2.69	1.6	2.80	3.1	14.45	2.3
- STEAMING	2.80	2.8	4.44	5.6	14.50	9.9	0.24	0.4	11.33	6.8	3.52	3.9	36.83	5.8
- MASKING									5.66	3.4			5.66	0.9
SEALING/CORROSION TREATMENT			1.45	1.8	2.50	1.7	10.65	18.7	4.32	2.6	1.70	1.9	20.62	3.2
PAINTING:														
- CLEANING	10.70	10.8	6.03	7.5	24.73	17.0	2.19	3.8	21.71	13.0	8.75	9.6	74.11	11.6
- MASKING/TAPING/ UNMASKING	15.30	15.4	14.55	18.2	24.72	17.0	11.40	20.0	18.32	11.0	16.31	17.9	100.60	15.7

PG 2 OF 2

TABLE A- 7 PRODUCTION SHOPS SURVEY (Equivalent People & Percent of NAVAIREWORKFAC Total)

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: STRIP/FINISH/PAINT

NAVAIREWORKFAC	ALA	MEDA	CHERRY	POINT	JACKSON	VILLE	NORF	OLK	NORTH I		PENSA		TOT	AL
MANU TECH OPERATION	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	EQUIV PEOPLE	%	PEOPLE	%
- DOPING FABRIC	2.40	2.4									1		2.40	0.4
- SANDING							l i		5.13	3.1			5.13	0.8
- PAINTING	31.90	32.2	21.14	26.4	26.00	17.8	14.25	25.0	25.91	15.5	23.11	25.4	142.31	22.2
REPAIR/RECONDITION OLD FABRIC SURFACES														
APPLY MARKINGS/DECALS	10.70	10.8	4.61	5.8	8.53	5.9	10.32	18.1	11.95	7.2	16.58	18.2	62.69	9.8
MANUFACTURE DECALS/ID PLATES					4.75	3.3	4.32	7.6					9.07	1.4
POWDER COATING/CODEP PROCESS/BLACK OXIDE							0.72	1.3	3.20	2.0			3.92	0.6
TOTAL	99.00	100.0	80.00	100.0	145.75	100.0	57.00	100.0	167.02	100.0	91.00	100.0	639.77	100.0
				.										

PG 1 OF 1

TABLE A- 2 PRODUCTION SHOPS SURVEY (Equivalent People & Percent of NAVAIREWORKFAC Total)

MANUFACTURING TECHNOLOGY FUNCTIONAL CATEGORY: DISASSEMBLE/ASSEMBLE

NAVAIREWORKFAC	ΛLAN	IEDA	CHERRY I	TOINT	JACKSON	VILLE	NORFO	OLK	NORTH I		PENSA		TOTA	AL .
MANU TECH OPERATION	EQUIV PEOPLE	%	EQUIV PEOPLE	%	PEOPLE	%%	PEOPLE PEOPLE	%	PEOPLE	%	PEOPLE		PEOPLE	%
DISASSEMBLE TO:														
- TEST/CHECK	29.98	9.1	24.97	9.1	. 22.86	15.0	18.20	6.1	33.97	10.0	26.28	14.2	156.26	9.9
- ROUTE FOR REWORK	46.89	14.2	22.06	8.1	19.34	12.7	12.55	4.2	18.10	5.3	13.72	7.4	132.66	8.4
- ACCESS OTHER PARTS/ AREAS	28.42	8.6	6.37	2.3	8.15	5.4	16.97	5.7	9.27	2.7	11.18	6.1	80.36	5.1
- REPAIR	17.12	5.2	20.00	7.3	10.09	6.6	16.40	5.5	30.71	9.0	14.23	7.7	108.55	6.9
- REWORK	21.14	6.4	20.19	7.4	8.45	5.6	14.46	4.9	20.69	6.1	34.95	18.9	119.88	7.6
- OVERHAUL	6.35	1.9	9.00	3.3	3.30	2.2	20.82	7.0	20.46	6.0	7.85	4.3	67.78	4.3
- MODIFY	15.75	4.8	30.27	11.1	2.20	1.4	15.90	5.4	17.26	5.1	6.80	3.7	88.18	5.6
- COMPLY WITH TECHNICAL DIRECTIVES	20.59	6.2	16.13	5.9	7.54	5.0	30.48	10.3	31.81	9.3	9.64	5.2	116.19	7.4
- TREAT CORROSION	3.60	1.1	2.73	. 1.0	0.99	0.7	7.61	2.6	4.60	1.3	4.54	2.5	24.07	1.5
- BACK-ROB							1.80	0.6					1.80	0.1
ASSEMBLE	140.18	42.5	121.75	44.5	69.08	45.4	139.89	47.1	154.42	45.2	55.50	30.1	680.82	43.
BALANCING							1.92	0.6					1.92	0.
TOTAL	330.02	100.0	273.47	100.0	152.00	100.0	297.00	100.0	341.29	100.0	184.69	100.0	1578.47	100.0

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